Natural Gas Combined Cycle "H" Class Gas Turbine

| CAPITAL INVESTMENT & | REVENUE REQUIREME | NT SUMMAR | Υ | |
|--|------------------------|-----------------|--------------|------------|
| TITLE/DEFINITION | | | | |
| Case: | Natural Gas Combined C | Cvcle-"H" | | |
| Plant Size: | 395.0 (MW,net) | HeatRate: | 6,396 | (Btu/kWh) |
| Primary/Secondary Fuel(type): | Natural Gas | Cost: | | (\$/MMBtu) |
| Design/Construction: | 2.25 (years) | BookLife: | | (years) |
| TPC(Plant Cost) Year: | 1998 (Jan.) | TPI Year: | 2005 | (Jan.) |
| Capacity Factor: | 65 (%) | | | |
| CAPITAL INVESTMENT | | \$x1000 | | \$/kW |
| Process Capital & Facilities | | 146,506 | | 370.9 |
| Engineering(incl.C.M.,H.O.& Fee) | | 11,720 | | 29.7 |
| Process Contingency | | , | | |
| Project Contingency | | 24,001 | - | 60.8 |
| TOTAL BLANT COOT(TBO) | | 4400 007 | | 101.0 |
| TOTAL PLANT COST(TPC) | # 400.00 | \$182,227 | | 461.3 |
| TOTAL CASH EXPENDED AFDC | \$182,227 | | | |
| TOTAL PLANT INVESTMENT(TPI) | \$6,825 | \$189,052 | | 478.6 |
| TOTAL PLANT INVESTMENT(TPI) | | \$109,032 | | 470.0 |
| Royalty Allowance | | | | |
| Preproduction Costs | | 5,645 | | 14.3 |
| Inventory Capital | | 497 | | 1.3 |
| Initial Catalyst & Chemicals(w/equip.) | | 450 | | 0.4 |
| Land Cost | | 150 | - | 0.4 |
| TOTAL CAPITAL REQUIREMENT(TCR |) | \$195,344 | | 494.5 |
| OPERATING & MAINTENANCE COSTS (1998 D | ollars) | \$x1000 | | \$/kW-yr |
| Operating Labor | | 1,474 | | 3.7 |
| Maintenance Labor | | 1,616 | | 4.1 |
| Maintenance Material | | 2,425 | | 6.1 |
| Administrative & Support Labor | | 773 | - | 2.0 |
| TOTAL OPERATION & MAINTENANCE | : | \$6,288 | | 15.9 |
| FIXED O & M | | | 10.35 | \$/kW-yr |
| VARIABLE O & M | | | 0.10 | ¢/kWh |
| CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars) | \$x1000 | | ¢/kWh |
| Water | (1000 Donais) | 445 | | 0.02 |
| Chemicals | | 258 | | 0.01 |
| Other Consumables | | | | |
| Waste Disposal | | | - | |
| TOTAL CONSUMABLE OPERATING C | OSTS | \$703 | | 0.03 |
| BY-PRODUCT CREDITS (1998 Dollars) | | | | |
| FUEL COST (1998 Dollars) | | \$38,875 | | 1.73 |
| | 1st Year (2005 \$) | Leveliz | zed (10th.Y | ear \$) |
| PRODUCTION COST SUMMARY | ¢/kWl | <u>n</u> | ¢/kWh | • • |
| Fixed O & M | 10.3/kW-yr 0.18 | , | 0.18 | |
| Variable O & M | 0.10 | | 0.10 | |
| Consumables | 0.03 | 3 | 0.03 | |
| By-product Credit | 4 7 | | 4.04 | |
| Fuel TOTAL PRODUCTION COST | <u> 1.73</u> 2.04 | | 1.84 2.15 | |
| LEVELIZED CARRYING CHARGES(Capital) | 2.0- | 66.8/kW-yr | 1.17 | |
| ZETELE ON THE OTHER CONTROL OF CO | | 30.0/KVV-yi | 1.17 | |
| LEVELIZED (10th.Year) BUSBAR COST OF PO | WER | | 3.32 | |

Escalation Rates

| ESTIMATE BASIS/FINANCIAL CRITERIA for REVE | NUE REQUIF | REMENT CALC | ULATIO | NS |
|---|------------------|------------------|-----------------|---------|
| GENERAL DATA/CHARACTERISTICS | | | | |
| Case Title: | Natural Gas | Combined Cycle | e-"H" | |
| Unit Size:/Plant Size: | 395.0 | MW,net | 395.0 | MWe |
| Location: | Middletown, | USA | | |
| Fuel: Primary/Secondary | Natural Gas | | | |
| Energy From Primary/Secondary Fuels | 6,396 | Btu/kWh | | Btu/kWh |
| Levelized Capacity Factor / Preproduction(equivalent months): | 65 | % | 1 | months |
| Capital Cost Year Dollars (Reference Year Dollars): | 1998 | (January) | | |
| Delivered Cost of Primary/Secondary Fuel | 2.70 | \$/MBtu | | \$/MBtu |
| Design/Construction Period: | 2.25 | years | | |
| Plant Startup Date (1st. Year Dollars): | 2005 | (January) | | |
| Land Area/Unit Cost | 100 | acre | \$1,500 | /acre |
| FINANCIAL CRITERIA | | | | |
| Project Book Life: | 20 | years | | |
| Book Salvage Value: | | % | | |
| Project Tax Life: | 20 | years | | |
| Tax Depreciation Method: | Accel. base | d on ACRS Clas | S | |
| Property Tax Rate: | 1.0 | % per year | | |
| Insurance Tax Rate: | 1.0 | % per year | | |
| Federal Income Tax Rate: | 34.0 | % | | |
| State Income Tax Rate: | 6.0 | % | | |
| Investment Tax Credit/% Eligible | | % | | % |
| Economic Basis: | 10th.Year | Constant Dollars | S | |
| Capital Structure Common Equity Preferred Stock | % of Total 20 | _ <u>C</u> | Cost(%) 16.5 | - |
| Debt Weighted Cost of Capital:(after tax) | 80 | 6.2 % | 5.8 | |

Over Book Life % per year 1.2 % per year 1.2 % per year

General

Primary Fuel Secondary Fuel 1998 to 2005 % per year 0.041 % per year 0.041 % per year

Client: DEPARTMENT OF ENERGY - Task 36 Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Natural Gas Combined Cycle-"H" 395.0 MW,net Case:

Plant Size: Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| A = = 1 | | F | Mataria | 1 -1 | | Calai | Bara Francis I | Frankri Ota | 04' | | TOTAL DI ANT | - 000- |
|-------------|---|-------------------|-------------------|-----------------------|-------------------|--------------|-------------------------|--------------|--------------------|----------------------|-------------------|----------|
| Acct No. | Item/Description | Equipment Cost | Material Cost | Lat Direct | Indirect | Sales Tax | Bare Erected Cost \$ | H.O.& Fee | Conting Process | Project | TOTAL PLANT | \$/kW |
| | COAL & CORRENT HANDLING | | | | | | | | | | | |
| 1 | COAL & SORBENT HANDLING | | | | | | | | | | | |
| 2 | COAL & SORBENT PREP & FEED | | | | | | | | | | | |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 5,172 | 2,381 | 4,027 | 282 | | \$11,862 | 949 | | 3,110 | \$15,922 | 40 |
| 4 | GASIFIER & ACCESSORIES | | | | | | | | | | | |
| | Gasifier & Auxiliaries High Temperature Cooling | | | | | | | | | | | |
| | Recycle Gas System | | | | | | | | | | | l |
| | Other Gasification Equipment | | | | | | | | | | | l |
| | SUBTOTAL 4 | | | | | | | | | | | |
| 5 | HOT GAS CLEANUP & PIPING | | | | | | | | | | | |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | | | | | | | | | | |
| | Combustion Turbine Generator | 41,448 | | 3,306 | 231 | | \$44,986 | 3,599 | | 4,859 | | 135 |
| 6.2-6.9 | Combustion Turbine Accessories SUBTOTAL 6 | 41,448 | 148 <i>148</i> | 170 <i>3,477</i> | 12 243 | | \$330 \$45,316 | 26 3,625 | | 107 <i>4</i> ,965 | \$463 \$53,907 | 1 136 |
| | SOBIOTAL 0 | 71,440 | 140 | 3,477 | 243 | | \$45,510 | 3,023 | | 4,905 | φ33,907 | 150 |
| 7 | HRSG, DUCTING & STACK | | | | | | | | | | | |
| | Heat Recovery Steam Generator | 13,414 | | 1,928 | 135 | | \$15,477 | 1,238 | | 1,672 | | 47 |
| 7.2-7.9 | HRSG Accessories, Ductwork and Stack SUBTOTAL 7 | 1,758 15,172 | 654 <i>654</i> | 1,241 <i>3,169</i> | 87 222 | | \$3,740 \$19,217 | 299 1,537 | | 560 2,232 | | 12 58 |
| | SOBIOTAL / | 13,172 | 054 | 3,109 | 222 | | φ19,217 | 1,557 | | 2,232 | \$22,980 | 50 |
| 8 | STEAM TURBINE GENERATOR | | | | | | | | | | | l |
| | Steam TG & Accessories | 9,984 | | 1,828 | 128 | | \$11,940 | 955 | | 1,289 | | 36 |
| 8.2-8.9 | Turbine Plant Auxiliaries and Steam Piping SUBTOTAL 8 | 4,883 14,867 | 149 <i>149</i> | 2,678 4,506 | 187 <i>315</i> | | \$7,897 \$19,837 | 632 1,587 | | 1,469 2,758 | | 25 61 |
| | SOBIOTAL 6 | 14,007 | 149 | 4,500 | 313 | | \$19,637 | 1,567 | | 2,730 | φ24,102 | 01 |
| 9 | COOLING WATER SYSTEM | 3,476 | 1,935 | 3,275 | 229 | | \$8,916 | 713 | | 1,731 | \$11,360 | 29 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | } | | | | | | | | | | |
| 11 | ACCESSORY ELECTRIC PLANT | 8,105 | 1,811 | 4,912 | 344 | | \$15,171 | 1,214 | | 2,649 | \$19,034 | 48 |
| 12 | INSTRUMENTATION & CONTROL | 2,867 | 1,469 | 5,115 | 358 | | \$9,810 | 785 | | 1,766 | \$12,361 | 31 |
| 13 | IMPROVEMENTS TO SITE | 1,831 | 1,053 | 3,667 | 257 | | \$6,807 | 545 | | 2,206 | \$9,557 | 24 |
| 14 | BUILDINGS & STRUCTURES | | 4,001 | 5,204 | 364 | | \$9,569 | 766 | | 2,584 | \$12,918 | 33 |
| | | | • | • | | | , | | | | | l |
| | TOTAL COST | \$92,938 | \$13,601 | \$37,352 | \$2,615 | | \$146,506 | \$11,720 | | \$24,001 | \$182,227 | 461 |

17-Dec-98

05:44 PM

Report Date:

Client: DEPARTMENT OF ENERGY - Task 36 Report Date: 17-Dec-98 05:44 PM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Natural Gas Combined Cycle-"H" 395.0 MW,net Case:

Plant Size: Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| Acct | | Equipment | Material | Lal | | Salac | Bare Erected | Engla CM | Contino | ronoios | TOTAL PLANT | COST |
|------|-------------------------------------|-----------|----------|-----------|----------|-------|--------------|------------|---------|---------|-------------|-------------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | COSt | Cost | Direct | manect | Iax | Cost \$ | 11.0.01 66 | Fiocess | Froject | Ψ | ψ/ K¥¥ |
| • | Coal Receive & Unload | | | | | | | | | | | |
| | Coal Stackout & Reclaim | | | | | | | | | | | |
| | Coal Conveyors & Yd Crush | | | | | | | | | | | |
| | Other Coal Handling | | | | | | | | | | | |
| | Sorbent Receive & Unload | | | | | | | | | | | |
| | Sorbent Stackout, Storage & Reclaim | | | | | | | | | | | |
| | Sorbent Conveyors | | | | | | | | | | | |
| | Other Sorbent Handling | | | | | | | | | | | , |
| | Coal & Sorbent Hnd.Foundations | | | | | | | | | | | , |
| 1.5 | SUBTOTAL 1. | | | | | | | | | | | , |
| 2 | COAL & SORBENT PREP & FEED | | | | | | | | | | | |
| | Coal Crushing & Drying | | | | | | | | | | | |
| | Prepared Coal Storage & Feed | | | | | | | | | | | , |
| | Coal & Sorbent Feed System | | | | | | | | | | | |
| | Misc.Coal Prep & Feed | | | | | | | | | | | |
| | Sorbent Prep Equipment | | | | | | | | | | | , |
| | Sorbent Storage & Feed | | | | | | | | | | | |
| | Sorbent Injection System | | | | | | | | | | | |
| | Booster Air Supply System | | | | | | | | | | | , |
| | Coal & Sorbent Feed Foundation | | | | | | | | | | | |
| | SUBTOTAL 2. | | | | | | | | | | | , |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | | | | | | | | | | | |
| | FeedwaterSystem | 644 | 1,252 | 668 | 47 | | \$2,611 | 209 | | 564 | \$3,384 | 9 |
| | Water Makeup & Pretreating | 354 | 38 | 203 | 14 | | \$610 | 49 | | 197 | \$856 | |
| | Other Feedwater Subsystems | 383 | 143 | 130 | 9 | | \$666 | 53 | | 144 | | 2 2 1 |
| | Service Water Systems | 27 | 58 | 205 | 14 | | \$306 | 24 | | 99 | \$429 | 1 ! |
| 3.5 | Other Boiler Plant Systems | 1,159 | 468 | 1,172 | 82 | | \$2,880 | 230 | | 622 | \$3,733 | 9 |
| | FO Supply Sys & Nat Gas | 94 | 178 | 336 | 24 | | \$632 | 51 | | 136 | \$818 | 2 |
| | Waste Treatment Equipment | 704 | | 413 | 29 | | \$1,146 | 92 | | 371 | \$1,609 | 4 |
| | Misc. Power Plant Equipment | 1,806 | 244 | 900 | 63 | | \$3,013 | 241 | | 976 | | 11 |
| | SUBTOTAL 3. | \$5,172 | \$2,381 | \$4,027 | \$282 | | \$11,862 | \$949 | | \$3,110 | \$15,922 | 40 |
| 4 | GASIFIER & ACCESSORIES | ' ' | . , | | | | . , | | | | . , | , |
| 4.1 | Gasifier & Auxiliaries | | | | | | | | | | | |
| 4.2 | High Temperature Cooling | | | | | | | | | | | |
| 4.3 | Recycle Gas System | | | | | | | | | | | |
| 4.4 | Booster Air Compression | | | | | | | | | | | |
| 4.5 | Misc. Gasification Equipment | w/4.1&4.2 | , | w/4.1&4.2 | | | | | | | | ļ |
| | Other Gasification Equipment | | | | | | | | | | | |
| | Major Component Rigging | w/4.1&4.2 | , | w/4.1&4.2 | | | | | | | | - |
| 4.9 | Gasification Foundations | | | | | | | | | | | - |
| | SUBTOTAL 4. | | | | | | | | | | | |

Client: DEPARTMENT OF ENERGY - Task 36

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"H"
Plant Size: 395.0 MW,net

Plant Size: 395.0 MW,net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

Report Date:

17-Dec-98

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| Acct | | Equipment | Material | Lak | or | Sales | Bare Erected | Eng'g CM | Contingencies | TOTAL PLANT | COST |
|--------------|---|-----------------|---------------------|-----------------------|--------------------|-------|--------------------------|----------------------|-----------------------|-------------|-----------------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process Project | \$ | \$/kW |
| | HOT GAS CLEANUP & PIPING Gas Desulfurization(Trans.Reactor) | | | | | | | | | | |
| 5.3 5.4 | Sulfur Recovery (Sulfator Sys.) Chloride Guard Particulate Removal | | | | | | | | | | |
| 5.6 | Blowback Gas Systems Fuel Gas Piping HGCU Foundations | | | | | | | | | | |
| 6 | SUBTOTAL 5. COMBUSTION TURBINE/ACCESSORIE | 1 | | | | | | | | | |
| 6.2 | Combustion Turbine Generator Combustion Turbine Accessories Compressed Air Piping | 41,448 w/6.1 | | 3,306 w/6.1 | 231 | | \$44,986 | 3,599 | 4,859 | \$53,444 | 135 |
| | Combustion Turbine Foundations SUBTOTAL 6. | \$41,448 | 148 \$148 | 170 \$3,477 | 12 \$243 | | \$330 \$45,316 | 26 \$3,625 | 107 \$4,965 | | 1 136 |
| | HRSG, DUCTING & STACK Heat Recovery Steam Generator HRSG Accessories | 13,414 | | 1,928 | 135 | | \$15,477 | 1,238 | 1,672 | \$18,387 | 47 |
| 7.3 | Ductwork Stack | 1,758 | 568 | 487 667 | 34 47 | | \$1,089 \$2,472 | 87 198 | 235 267 | | 4 7 |
| | HRSG,Duct & Stack Foundations SUBTOTAL 7. | \$15,172 | 86 \$654 | 86 \$3,169 | 6 \$222 | | \$179 \$19,217 | 14 \$1,537 | 58 \$2,232 | | 1 58 |
| 8 | STEAM TURBINE GENERATOR Steam TG & Accessories | 0.094 | | 1 000 | 128 | | ¢11.040 | 955 | 1,289 | ¢14.194 | 36 |
| | Turbine Plant Auxiliaries | 9,984 | | 1,828 179 | 13 | | \$11,940 \$268 | 21 | 1,209 | | 1 |
| | Condenser & Auxiliaries | 1,986 | | 550 | 38 | | \$2,574 | 206 | 278 | | 8 |
| | Steam Piping | 2,820 | | 1,485 | 104 | | \$4,409 | 353 | 952 | | 14 |
| | TG Foundations | , , , | 149 | 464 | 33 | | \$646 | 52 | 209 | | 2 |
| | SUBTOTAL 8. | \$14,867 | \$149 | \$4,506 | \$315 | | \$19,837 | \$1,587 | \$2,758 | \$24,182 | 61 |
| 9 | COOLING WATER SYSTEM | | | | | | | | | | |
| | Cooling Towers | 2,652 | | 588 | 41 | | \$3,281 | 262 | 354 | | 10 |
| | Circulating Water Pumps Circ.Water System Auxiliaries | 388 47 | | 37 7 | 3 | | \$427 \$55 | 34 | 46 6 | * | 1 |
| | Circ.Water System Auxiliaries Circ.Water Piping | 47 | 919 | 1,033 | 72 | | \$2,025 | 162 | 437 | | 7 |
| | Make-up Water System | 106 | 010 | 158 | 11 | | \$275 | 22 | 59 | . , | 1 |
| | Component Cooling Water Sys | 284 | 339 | 252 | 18 | | \$892 | 71 | 193 | | 3 |
| | Circ.Water System Foundations | | 677 | 1,200 | 84 | | \$1,961 | 157 | 635 | \$2,753 | 7 |
| | SUBTOTAL 9. | \$3,476 | \$1,935 | \$3,275 | \$229 | | \$8,916 | \$713 | \$1,731 | \$11,360 | 29 |
| | ASH/SPENT SORBENT HANDLING SYS Gasifier Ash Removal Gasifier Ash Depressurization | 3 | | | | | | | | | |
| 10.3 | Cleanup Ash Depressurization High Temperature Ash Piping | | | | | | | | | | |
| 10.5 10.6 | Other Ash Recovery Equipment Ash Storage Silos | | | | | | | | | | |
| | Ash Transport & Feed Equipment | | | | | | | | | | |
| | Misc. Ash Handling Equipment | | | | | | | | | | |
| 10.9 | Ash/Spent Sorbent Foundation SUBTOTAL 10. | | | | | | | | | | |

 Client:
 DEPARTMENT OF ENERGY - Task 36
 Report Date:
 17-Dec-98

 Project:
 Market Based Advanced Coal Power Systems
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TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"H"

 Plant Size:
 395.0 MW,net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998
 (\$x1000)

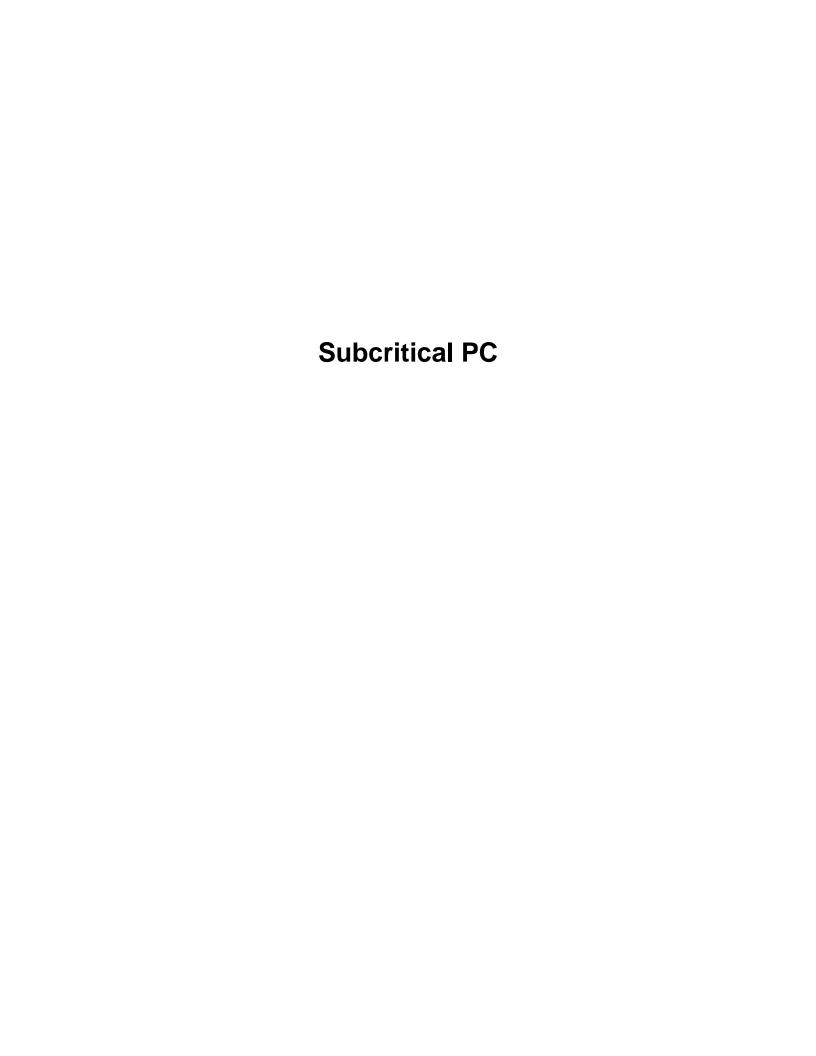
| Acct | | Equipment | Material | Lab | or | Sales | Bare Erected | Eng'g CM | Contino | encies | TOTAL PLANT | COST |
|------|--------------------------------|-----------|----------|----------|-------------|-------|--------------|-----------|---------|----------|--------------|-----------------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | * | | | | * | |
| 11.1 | Generator Equipment | 1,377 | | 219 | 15 | | \$1,610 | 129 | | 174 | \$1,913 | 5 |
| 11.2 | Station Service Equipment | 1,588 | | 131 | 9 | | \$1,728 | 138 | | 187 | \$2,053 | 5 |
| 11.3 | Switchgear & Motor Control | 1,266 | | 211 | 15 | | \$1,491 | 119 | | 242 | \$1,852 | 5 |
| 11.4 | Conduit & Cable Tray | | 763 | 2,395 | 168 | | \$3,326 | 266 | | 718 | \$4,310 | 11 |
| 11.5 | Wire & Cable | | 819 | 818 | 57 | | \$1,695 | 136 | | 366 | \$2,197 | 6 |
| | Protective Equipment | | 72 | 239 | 17 | | \$327 | 26 | | 53 | \$407 | 1 |
| 11.7 | | 639 | | 14 | 1 | | \$655 | 52 | | 106 | \$813 | 2 |
| | Main Power Transformers | 3,235 | | 454 | 32 | | \$3,721 | 298 | | 603 | \$4,621 | 12 |
| 11.9 | Electrical Foundations | | 156 | 432 | 30 | | \$618 | 49 | | 200 | \$868 | 2 |
| | SUBTOTAL 11. | \$8,105 | \$1,811 | \$4,912 | \$344 | | \$15,171 | \$1,214 | | \$2,649 | \$19,034 | 48 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| | IGCC Control Equipment | | | | | | | | | | | |
| | Combustion Turbine Control | | | | | | | | | | | |
| | Steam Turbine Control | | | | | | | | | | | |
| | Other Major Component Control | | | | | | | | | | | |
| | Signal Processing Equipment | w/12.7 | | w/12.7 | | | | | | | | |
| | Control Boards, Panels & Racks | 118 | | 69 | 5 | | \$192 | 15 | | 41 | \$249 | 1 |
| | Computer & Accessories | 1,883 | | 97 | 7 | | \$1,986 | 159 | | 215 | \$2,360 | 6 |
| | Instrument Wiring & Tubing | | 1,469 | 4,565 | 320 | | \$6,353 | 508 | | 1,372 | \$8,234 | 21 |
| 12.9 | Other I & C Equipment | 866 | 44.400 | 385 | 27 | | \$1,278 | 102 | | 138 | \$1,519 | 4 |
| | SUBTOTAL 12. | \$2,867 | \$1,469 | \$5,115 | \$358 | | \$9,810 | \$785 | | \$1,766 | \$12,361 | 31 |
| 13 | IMPROVEMENTS TO SITE | | 0.4 | 040 | 40 | | 0005 | | | 000 | # 000 | |
| | Site Preparation | | 31 | 612 | 43 | | \$685 | 55 | | 222 | \$962 | 2 |
| | Site Improvements | 4 004 | 1,022 | 1,261 | 88 | | \$2,371 | 190 | | 768 | \$3,329 | 8 |
| 13.3 | Site Facilities SUBTOTAL 13. | 1,831 | 64.050 | 1,794 | 126 | | \$3,751 | 300 | | 1,215 | \$5,266 | 13 24 |
| 14 | BUILDINGS & STRUCTURES | \$1,831 | \$1,053 | \$3,667 | \$257 | | \$6,807 | \$545 | | \$2,206 | \$9,557 | 24 |
| | Combustion Turbine Area | | 223 | 141 | 10 | | \$374 | 30 | | 101 | \$504 | 1 |
| | Steam Turbine Building | | 1,652 | 2,621 | 183 | | \$4,456 | 357 | | 1,203 | \$6,016 | 15 |
| | Administration Building | | 422 | 341 | 24 | | \$786 | 63 | | 212 | \$1,061 | 3 |
| | Circulation Water Pumphouse | | 83 | 49 | 3 | | \$135 | 11 | | 37 | \$183 | 0 |
| | Water Treatment Buildings | | 526 | 571 | 40 | | \$1.137 | 91 | | 307 | \$1,535 | 4 |
| | Machine Shop | | 216 | 164 | 12 | | \$392 | 31 | | 106 | \$529 | 1 |
| | Warehouse | | 348 | 250 | 18 | | \$616 | 49 | | 166 | \$832 | 2 |
| | Other Buildings & Structures | | 209 | 181 | 13 | | \$402 | 32 | | 100 | \$543 | 1 |
| | Waste Treating Building & Str. | | 322 | 886 | 62 | | \$1,270 | 102 | | 343 | \$1,715 | 4 |
| 14.9 | SUBTOTAL 14. | | \$4,001 | \$5,204 | \$364 | | \$9,569 | \$766 | | \$2,584 | \$12,918 | 33 |
| | 30B101AL 14. | | φ+,υυ ι | ψ3,204 | 4304 | | φ3,303 | \$100 | | Ψ2,304 | φ12,310 | 33 |
| | TOTAL COST | \$92,938 | \$13,601 | \$37,352 | \$2,615 | | \$146,506 | \$11,720 | | \$24,001 | \$182,227 | 461 |

| CONTINGENCY FACTOR Natural Gas Combined Cycle-"H" | RS | |
|---|--------------------|--------------------------|
| | Contingency Factor | rs(%) <u>%Project</u> |
| <u>Item/Description</u> | %Process | 76F10Ject |
| COAL & SORBENT HANDLING | | |
| COAL & SORBENT PREP & FEED | | |
| FEEDWATER & MISC. BOP SYSTEMS | | 24.3 |
| GASIFIER & ACCESSORIES | | |
| Gasifier & Auxiliaries | | |
| High Temperature Cooling | | |
| Recycle Gas System | | |
| Other Gasification Equipment | | |
| HOT GAS CLEANUP & PIPING | | |
| COMBUSTION TURBINE/ACCESSORIES | | |
| Combustion Turbine Generator | | 10.0 |
| Combustion Turbine Accessories | | 30.0 |
| HRSG, DUCTING & STACK | | |
| Heat Recovery Steam Generator | | 10.0 |
| HRSG Accessories, Ductwork and Stack | | 13.9 |
| STEAM TURBINE GENERATOR | | |
| Steam TG & Accessories | | 10.0 |
| Turbine Plant Auxiliaries and Steam Piping | | 17.2 |
| COOLING WATER SYSTEM | | 18.0 |
| ASH/SPENT SORBENT HANDLING SYS | | |
| ACCESSORY ELECTRIC PLANT | | 16.2 |
| INSTRUMENTATION & CONTROL | | 16.7 |
| IMPROVEMENTS TO SITE | | 30.0 |
| BUILDINGS & STRUCTURES | | 25.0 |
| | | |
| | | |

| OPERATING LABOR RE | EQUIREMENTS | |
|--|-----------------|--------------|
| Natural Gas Combined Cycle-"H" | | |
| Operating Labor Rate(base): | 25.89 \$/hour | |
| Operating Labor Burden: | 30.00 % of bas | е |
| Labor O-H Charge Rate: | 25.00 % of labo | or |
| Operating Labor Requirements(O.J.)per Shift: | | Total |
| Category | 1 unit/mod. | <u>Plant</u> |
| Skilled Operator | 1.0 | 1.0 |
| Operator | 2.0 | 2.0 |
| Foreman | 1.0 | 1.0 |
| Lab Tech's, etc. | <u>1.0</u> | <u>1.0</u> |
| TOTAL-O.J.'s | 5.0 | 5.0 |

| CONSUMABLES, BY-PROD | DUCTS & FUELS DATA | | |
|--------------------------------|--------------------|--------|--------|
| Natural Gas Combined Cycle-"H" | Consum | | l loit |
| Itam/Decembries | Consum | • | Unit |
| Item/Description | <u>Initial</u> | /Day | _Cost_ |
| Water(/1000 gallons) | | 2,344 | 0.80 |
| Chemicals* | | | |
| MU & WT Chem.(lbs)** | 209,444 | 6,981 | 0.16 |
| Limestone (ton)** | , | , | 15.78 |
| Z Sorb (lbs)** | | | 3.50 |
| Nahcolite(ton)** | | | 270.00 |
| Other | | | |
| Supplemental Fuel(MBtu)** | | | |
| Gases,N2 etc.(/100scf) | | | |
| L.P. Steam(/1000 pounds) | | | |
| Waste Disposal | | | |
| Sludge(ton) | | | |
| Slag(ton) | | | 10.00 |
| By-products & Emissions | | | |
| Sulfuric Acid(pounds) | | | 68.00 |
| | | | |
| Fuel(MMBtu) | | 60,638 | 2.70 |

| MAINTENANCE FACTORS Natural Gas Combined Cycle-"H" | |
|--|----------------------|
| Item/Description | Maintenance <u>%</u> |
| | |
| COAL & SORBENT HANDLING | |
| COAL & SORBENT PREP & FEED | |
| FEEDWATER & MISC. BOP SYSTEMS | 2.0 |
| GASIFIER & ACCESSORIES | |
| Gasifier & Auxiliaries | |
| High Temperature Cooling | |
| Recycle Gas System | |
| Other Gasification Equipment | |
| HOT GAS CLEANUP & PIPING | |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | 11.4 |
| Combustion Turbine Accessories | 0.5 |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | 2.0 |
| HRSG Accessories, Ductwork and Stack | 1.5 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 1.5 |
| Turbine Plant Auxiliaries and Steam Piping | 1.7 |
| COOLING WATER SYSTEM | 1.3 |
| ASH/SPENT SORBENT HANDLING SYS | |
| ACCESSORY ELECTRIC PLANT | 1.5 |
| INSTRUMENTATION & CONTROL | 1.6 |
| IMPROVEMENTS TO SITE | 1.2 |
| BUILDINGS & STRUCTURES | 1.4 |
| | |
| | |



| CAPITAL INVESTMENT & I | REVENUE REQUIRE | MENT SUMMAI | RY | |
|---|-----------------------|------------------------|--------------|--------------|
| TITLE/DEFINITION | | | | |
| Case: | Subcritical PC | | | |
| Plant Size: | 397.5 (MW,n | | | (Btu/kWh) |
| 1 7 7 (-71) | Illnois #6 | Cost: | | (\$/MMBtu) |
| Design/Construction: | 3 (years) | BookLife: TPI Year: | | (years) |
| TPC(Plant Cost) Year: Capacity Factor: | 1998 (Jan.) 85 (%) | i Pi Year. | 2005 | (Jan.) |
| Оараску Гаског. | 00 (70) | | | |
| CAPITAL INVESTMENT | | \$x1000 | | <u>\$/kW</u> |
| Process Capital & Facilities | | 360,255 | | 906.3 |
| Engineering(incl.C.M.,H.O.& Fee) | | 28,820 | | 72.5 |
| Process Contingency | | F0.70F | | 450.4 |
| Project Contingency | | 59,765 | | 150.4 |
| TOTAL PLANT COST(TPC) | | \$448,840 | | 1129.2 |
| TOTAL CASH EXPENDED | \$448 | | | 0 |
| AFDC | · | ,443 | | |
| TOTAL PLANT INVESTMENT(TPI) | | \$471,283 | | 1185.7 |
| | | | | |
| Royalty Allowance Preproduction Costs | | 44 570 | | 20.4 |
| Inventory Capital | | 11,570 4,253 | | 29.1 10.7 |
| Initial Catalyst & Chemicals(w/equip.) | | 4,233 | | 10.7 |
| Land Cost | | 480 | | 1.2 |
| | | - | - | |
| TOTAL CAPITAL REQUIREMENT(TCR |) | \$487,586 | | 1226.7 |
| OPERATING & MAINTENANCE COSTS (1998 D | ollars) | \$x1000 | | \$/kW-yr |
| Operating Labor | - | 4,127 | | 10.4 |
| Maintenance Labor | | 2,001 | | 5.0 |
| Maintenance Material | | 3,002 | | 7.6 |
| Administrative & Support Labor | | 1,532 | | 3.9 |
| TOTAL OPERATION & MAINTENANCE | : | \$10,662 | | 26.8 |
| FIXED O & M | | | 22.80 | \$/kW-yr |
| VARIABLE O & M | | | 0.05 | ¢/kWh |
| CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars) | \$x1000 | | ¢/kWh |
| Water | | 1,359 | | 0.05 |
| Chemicals | | 2,643 | | 0.09 |
| Other Consumables | | | | |
| Waste Disposal | | 1,150 | | 0.04 |
| TOTAL CONSUMABLE OPERATING C | OSTS | \$5,152 | | 0.17 |
| BY-PRODUCT CREDITS (1998 Dollars) | | | | |
| FUEL COST (1998 Dollars) | | \$33,719 | | 1.14 |
| | 1st Year (2005 \$ | <u>Lev</u> el | ized (10th.Y | ear \$) |
| PRODUCTION COST SUMMARY | ¢/l | <u>kWh</u> | ¢/kWh | |
| Fixed O & M | , | 0.31 22.8/kW-yr | | |
| Variable O & M | | 0.05 | 0.05 | |
| Consumables By-product Credit | ' | 0.17 | 0.17 | |
| Fuel | | 1.04 | 0.98 | |
| TOTAL PRODUCTION COST | | 1.57 | 1.52 | |
| LEVELIZED CARRYING CHARGES(Capital) | | 165.6/kW-yr | 2.22 | |
| LEVELIZED (10th. Year) BUSBAR COST OF PO | WER | | 3.74 | |
| | | | | |

| ESTIMATE BASIS/FINANCIAL CRIT | ERIA for REVENUE REQUIREMENT CALCULATIONS |
|--|--|
| GENERAL DATA/CHARACTERISTICS | |
| Case Title: | Subcritical PC |
| Unit Size:/Plant Size: | 397.5 MW,net 397.5 MWe |
| Location: | Middletown, USA |
| Fuel: Primary/Secondary | Illnois #6 |
| Energy From Primary/Secondary Fuels | 9,077 Btu/kWh Btu/kWh |
| Levelized Capacity Factor / Preproduction(equiv | valent months): 85 % 1 months |
| Capital Cost Year Dollars (Reference Year Dollars) | ars): 1998 (January) |
| Delivered Cost of Primary/Secondary Fuel | 1.26 \$/MBtu \$/MBtu |
| Design/Construction Period: | 3 years |
| Plant Startup Date (1st. Year Dollars): | 2005 (January) |
| Land Area/Unit Cost | 320 acre \$1,500 /acre |
| FINANCIAL CRITERIA | |
| Project Book Life: | 20 years |
| Book Salvage Value: | % |
| Project Tax Life: | 20 years |
| Tax Depreciation Method: | Accel. based on ACRS Class |
| Property Tax Rate: | 1.0 % per year |
| Insurance Tax Rate: | 1.0 % per year |
| Federal Income Tax Rate: | 34.0 % |
| State Income Tax Rate: | 6.0 % |
| Investment Tax Credit/% Eligible | % % |
| Economic Basis: | 10th.Year Constant Dollars |
| Capital Structure Common Equity Preferred Stock | <u>% of Total</u> <u>Cost(%)</u> 20 16.5 |
| Debt Weighted Cost of Capital:(after tax) | 80 5.8 6.2 % |
| Escalation Rates | Over Book Life 1998 to 2005 General % per year % per year Primary Fuel -1.1 % per year -1.36 % per year Secondary Fuel 1.2 % per year 0.041 % per year |

 Client:
 DEPARTMENT OF ENERGY
 Report Date:
 14-Aug-98

 Project:
 Market Based Advanced Coal Power Systems
 07:54 AM

TOTAL PLANT COST SUMMARY

Case: Subcritical PC

Plant Size: 397.5 MW,net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| | 1 | | | | | | - | d Eng'g CM Contingencies | | | | |
|-------------|---|-----------------------------------|------------------|--------------------------|--------------------------|--------------|---|--------------------------------|---------|--------------------------------|----------------------------------|-------------------------|
| Acct No. | Item/Description | Equipment Cost | Material Cost | Lat Direct | oor Indirect | Sales Tax | Bare Erected Cost \$ | Eng'g CM H.O.& Fee | | encies Project | TOTAL PLANT | \$/kW |
| 140. | | | | Direct | | IUA | 0031 \$ | 11.0.4166 | 1100033 | 110,000 | " | Ψ/ΚΨ |
| 1 | COAL & SORBENT HANDLING | 6,997 | 2,063 | 5,331 | 373 | | \$14,764 | 1,181 | | 3,189 | \$19,134 | 48 |
| 2 | COAL & SORBENT PREP & FEED | 8,789 | | 2,748 | 192 | | \$11,729 | 938 | | 2,533 | \$15,201 | 38 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 15,953 | | 6,963 | 487 | | \$23,403 | 1,872 | | 6,002 | \$31,276 | 79 |
| 4.2 | PC BOILER & ACCESSORIES PC Boiler Open Open | 46,861 | | 19,453 | 1,362 | | \$67,676 | 5,414 | | 7,309 | \$80,400 | 202 |
| | Boiler BoP (w/FD & ID Fans) SUBTOTAL 4 | 3,260 50,122 | | 1,074 20,528 | 75 1,437 | | \$4,410 <i>\$72,086</i> | 353 5,767 | | 476 7,785 | | 13 215 |
| 5 | FLUE GAS CLEANUP | 34,039 | | 18,650 | 1,306 | | \$53,995 | 4,320 | | 5,831 | \$64,146 | 161 |
| | COMBUSTION TURBINE/ACCESSORIE Combustion Turbine Generator Combustion Turbine Accessories SUBTOTAL 6 | N/A | | N/A | | | | | | | | |
| | HRSG, DUCTING & STACK Heat Recovery Steam Generator HRSG Accessories, Ductwork and Stack SUBTOTAL 7 | N/A 9,803 <i>9,803</i> | 289 289 | N/A 7,270 7,270 | 509 509 | | \$17,871 <i>\$17,871</i> | 1,430 <i>1,430</i> | | 2,992 2,992 | | 56 56 |
| | STEAM TURBINE GENERATOR Steam TG & Accessories Turbine Plant Auxiliaries and Steam Piping SUBTOTAL 8 | 30,684 11,740 <i>42,424</i> | 358 358 | 5,055 6,439 11,494 | 354 451 <i>805</i> | | \$36,093 \$18,988 <i>\$55,081</i> | 2,887 1,519 <i>4,406</i> | | 3,898 3,531 <i>7,429</i> | \$42,879 \$24,037 \$66,916 | 108 60 <i>168</i> |
| 9 | COOLING WATER SYSTEM | 7,623 | 3,966 | 7,208 | 505 | | \$19,301 | 1,544 | | 3,718 | \$24,563 | 62 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | 6,025 | 80 | 11,018 | 771 | | \$17,893 | 1,431 | | 2,930 | \$22,254 | 56 |
| 11 | ACCESSORY ELECTRIC PLANT | 9,095 | 2,830 | 7,720 | 540 | | \$20,185 | 1,615 | | 3,574 | \$25,373 | 64 |
| 12 | INSTRUMENTATION & CONTROL | 6,037 | | 5,006 | 350 | | \$11,393 | 911 | | 1,917 | \$14,222 | 36 |
| 13 | IMPROVEMENTS TO SITE | 1,871 | 1,076 | 3,747 | 262 | | \$6,957 | 557 | | 2,254 | \$9,767 | 25 |
| 14 | BUILDINGS & STRUCTURES | | 15,586 | 18,701 | 1,309 | | \$35,597 | 2,848 | | 9,611 | \$48,055 | 121 |
| | TOTAL COST | \$198,778 | \$26,247 | \$126,383 | \$8,847 | | \$360,255 | \$28,820 | | \$59,765 | \$448,840 | 1129 |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98 07:54 AM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Case: Subcritical PC

Plant Size: 397.5 MW,net Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| Acct | | Equipment | Material | Lab | | Calaa | Bare Erected | Engla CM | Conting | ·onelee | TOTAL PLANT | COST |
|------|--------------------------------|-------------------|----------|----------|----------|-------|--------------|-----------|---------|---------|-------------|---------|
| No. | Item/Description | Equipment Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | Cost | Cost | Direct | munect | тах | COSI \$ | n.o.a ree | FIUCESS | Froject | Ą | . φ/K¥¥ |
| 1 ' | Coal Receive & Unload | 1,711 | | 941 | 66 | | \$2,718 | 217 | | 587 | \$3,522 | 9 |
| | Coal Stackout & Reclaim | 2,211 | | 604 | 42 | | \$2,856 | 229 | | 617 | \$3,702 | 9 |
| | Coal Conveyors & Yd Crush | 2,055 | | 597 | 42 | | \$2,694 | 216 | | 582 | \$3,492 | 9 |
| | Other Coal Handling | 538 | | 138 | 10 | | \$686 | 55 | | 148 | \$888 | 2 |
| | Sorbent Receive & Unload | 71 | | 26 | 2 | | \$99 | 8 | | 21 | \$129 | 2 |
| | Sorbent Stackout & Reclaim | / ' | | 20 | _ | | Ψ55 | | | 21 | Ψ123 | ١ |
| | Sorbent Conveyors | 412 | | 122 | 9 | | \$542 | 43 | | 117 | \$702 | 2 |
| | Other Sorbent Handling | 712 | | 122 | 3 | | Ψ0-12 | 10 | | | Ψ102 | - |
| | Coal & Sorbent Hnd.Foundations | | 2,063 | 2,903 | 203 | | \$5,169 | 414 | | 1,117 | \$6,699 | 17 |
| ' | SUBTOTAL 1. | \$6,997 | \$2,063 | \$5,331 | \$373 | | \$14,764 | \$1,181 | | \$3,189 | \$19,134 | 48 |
| 2 | COAL & SORBENT PREP & FEED | 40,001 | Ψ2,000 | ψο,σσ. | 40.0 | | ψ,,, σ | ψ.,.σ. | | ψ0,100 | ψ10,104 | |
| | Coal Crushing & Drying | 969 | | 227 | 16 | | \$1,212 | 97 | | 262 | \$1,571 | 4 |
| | Coal Conveyor / Storage | 5,735 | | 1,508 | 106 | | \$7,348 | 588 | | 1,587 | \$9,524 | 24 |
| | Coal Injection System | 0,.00 | | .,000 | | | ψ.,σ.σ | | | .,00. | Ψ0,02 . | |
| | Misc.Coal Prep & Feed | | | | | | | | | | | |
| | Sorbent Prep Equipment | 1,926 | | 482 | 34 | | \$2,442 | 195 | | 527 | \$3,165 | 8 |
| | Sorbent Storage & Feed | 159 | | 530 | 37 | | \$726 | 58 | | 157 | \$941 | 2 |
| | Sorbent Injection System | | | | | | ¥: | | | | 44 | - |
| | Booster Air Supply System | | | | | | | | | | | |
| | Coal & Sorbent Feed Foundation | | | | | | | | | | | |
| | SUBTOTAL 2. | \$8,789 | | \$2,748 | \$192 | | \$11,729 | \$938 | | \$2,533 | \$15,201 | 38 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | , , , , , | | • , | • - | | , , - | , | | , , | , , , | |
| 3.1 | FeedwaterSystem | 4,520 | | 1,436 | 101 | | \$6,057 | 485 | | 1,308 | \$7,849 | 20 |
| 3.2 | Water Makeup & Pretreating | 2,307 | | 816 | 57 | | \$3,180 | 254 | | 1,030 | \$4,464 | 11 |
| 3.3 | Other Feedwater Subsystems | 3,476 | | 1,236 | 87 | | \$4,798 | 384 | | 1,036 | \$6,218 | 16 |
| 3.4 | Service Water Systems | 443 | | 270 | 19 | | \$732 | 59 | | 237 | \$1,028 | 3 |
| 3.5 | Other Boiler Plant Systems | 1,827 | | 1,510 | 106 | | \$3,443 | 275 | | 744 | \$4,462 | 11 |
| 3.6 | FO Supply Sys & Nat Gas | 133 | | 193 | 13 | | \$339 | 27 | | 73 | \$439 | 1 |
| 3.7 | Waste Treatment Equipment | 1,672 | | 979 | 69 | | \$2,720 | 218 | | 881 | \$3,819 | 10 |
| 3.8 | Misc. Power Plant Equipment | 1,575 | | 523 | 37 | | \$2,134 | 171 | | 691 | \$2,996 | 8 |
| | SUBTOTAL 3. | \$15,953 | | \$6,963 | \$487 | | \$23,403 | \$1,872 | | \$6,002 | \$31,276 | 79 |
| 4 | PC BOILER & ACCESSORIES | | | | | | | | | | | |
| | PC Boiler | 46,861 | | 19,453 | 1,362 | | \$67,676 | 5,414 | | 7,309 | \$80,400 | 202 |
| 4.2 | Open | | | | | | | | | | | |
| | Open | | | | | | | | | | | |
| | Boiler BoP (w/FD & ID Fans) | 3,260 | | 1,074 | 75 | | \$4,410 | 353 | | 476 | \$5,239 | 13 |
| | Primary Air System | w/4.1 | | w/4.1 | | | | | | | | |
| | Secondary Air System | w/4.1 | | w/4.1 | | | | | | | | |
| | Major Component Rigging | | | w/4.1 | | | | | | | | |
| 4.9 | PC Foundations | | w/14.1 | w/14.1 | | | | | | | | |
| | SUBTOTAL 4. | \$50,122 | | \$20,528 | \$1,437 | | \$72,086 | \$5,767 | | \$7,785 | \$85,639 | 215 |

Client: DEPARTMENT OF ENERGY Project:

Market Based Advanced Coal Power Systems

Report Date:

14-Aug-98

07:54 AM

TOTAL PLANT COST SUMMARY

Subcritical PC Case:

Plant Size: 397.5 MW,net

Estimate Type: Conceptual

1998 Cost Base (Jan)

(\$x1000)

| | Flant Size. | 397.3 | ivivv ,riet | LSIII | nate Type. | Conce | ptuai | CO | st base (Jan) | 1990 | (φχ1000) | |
|------|---|---------------------------------------|-------------|------------|------------|-------|---|-----------|---------------|---------|-------------|-------|
| Acct | | Equipment | Material | Lal | oor | Sales | Bare Erected | Eng'g CM | Conting | gencies | TOTAL PLANT | COST |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| _ | FLUE CAS OL FANILID | | | | | | | | | | | |
| 5 | FLUE GAS CLEANUP | 45.045 | | 0.004 | 4.40 | | 047.544 | 4 400 | | 4 00 4 | #00.000 | |
| | Absorber Vessels & Accessories | 15,315 | | 2,081 | 146 | | \$17,541 | 1,403 | | 1,894 | | 52 |
| | Other FGD | 1,116 | | 1,018 | 71 | | \$2,206 | 176 | | 238 | | 7 |
| | ESP & Accessories | 12,124 | | 4,161 | 291 | | \$16,577 | 1,326 | | 1,790 | | 50 |
| | Other Particulate Removal Materials | 3,371 | | 5,773 | 404 | | \$9,548 | 764 | | 1,031 | \$11,343 | 29 |
| | Gypsum Dewatering System | 2,113 | | 5,617 | 393 | | \$8,123 | 650 | | 877 | \$9,651 | 24 |
| | Mercury Removal System | | | | | | | | | | | |
| 5.9 | Open SUBTOTAL 5. | \$34,039 | | \$18.650 | \$1,306 | | \$53.995 | \$4,320 | | \$5,831 | \$64,146 | 161 |
| 6 | COMBUSTION TURBINE/ACCESSORIE | , | | \$10,030 | φ1,300 | | \$55,995 | \$4,320 | | φυ,ου ι | \$04,140 | 101 |
| | Combustion Turbine Generator | N/A | | N/A | | | | | | | | |
| | Combustion Turbine Generator Combustion Turbine Accessories | N/A | | N/A N/A | | | | | | | | |
| | Compressed Air Piping | IN/A | | IN/A | | | | | | | | |
| | Combustion Turbine Foundations | | | | | | | | | | | |
| 0.9 | SUBTOTAL 6. | | | | | | | | | | | |
| 7 | HRSG, DUCTING & STACK | • | | | | | | | | | | |
| | Heat Recovery Steam Generator | N/A | | N/A | | | | | | | | |
| | HRSG Accessories | IN/A | | IN/A | | | | | | | | |
| 1 | Ductwork | 4,605 | | 3,614 | 253 | | \$8.472 | 678 | | 1,830 | \$10,980 | 28 |
| | Stack | 5,198 | | 3,290 | 230 | | \$8,718 | 697 | | 942 | | 26 |
| | HRSG,Duct & Stack Foundations | 3,130 | 289 | 366 | 26 | | \$681 | 54 | | 221 | \$956 | 2 |
| '.5 | SUBTOTAL 7. | \$9,803 | \$289 | \$7,270 | \$509 | | \$17,871 | \$1,430 | | \$2,992 | | 56 |
| 8 | STEAM TURBINE GENERATOR | Ψ3,003 | Ψ203 | Ψ1,210 | ψυσυ | | \$17,071 | Ψ1,430 | | ΨΣ,33Σ | ΨΖΖ,Σ33 | 30 |
| | Steam TG & Accessories | 30,684 | | 5,055 | 354 | | \$36,093 | 2,887 | | 3,898 | \$42,879 | 108 |
| | Turbine Plant Auxiliaries | 185 | | 429 | 30 | | \$645 | 52 | | 70 | 1 / | 2 |
| | Condenser & Auxiliaries | 4,775 | | 1,321 | 92 | | \$6.189 | 495 | | 668 | | 18 |
| | Steam Piping | 6,780 | | 3,572 | 250 | | \$10,601 | 848 | | 2,290 | | 35 |
| | TG Foundations | 0,.00 | 358 | 1,117 | 78 | | \$1,552 | 124 | | 503 | | 5 |
| 0.0 | SUBTOTAL 8 | \$42,424 | \$358 | \$11,494 | \$805 | | \$55,081 | \$4,406 | | \$7,429 | | 168 |
| 9 | COOLING WATER SYSTEM | · · · · · · · · · · · · · · · · · · · | **** | 4 , | **** | | , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | 4 1,133 | | 41,1-0 | 400,010 | |
| | Cooling Towers | 6,150 | | 1,364 | 96 | | \$7,610 | 609 | | 822 | \$9.040 | 23 |
| | Circulating Water Pumps | 899 | | 86 | 6 | | \$991 | 79 | | 107 | \$1,178 | 3 |
| 1 | Circ.Water System Auxiliaries | 110 | | 16 | 1 | | \$127 | 10 | | 14 | 1 / / | 0 |
| | Circ.Water Piping | | 2,132 | 2,397 | 168 | | \$4,697 | 376 | | 1,014 | | 15 |
| | Make-up Water System | 245 | | 366 | 26 | | \$637 | 51 | | 138 | \$825 | 2 |
| | Component Cooling Water Sys | 220 | 263 | 195 | 14 | | \$692 | 55 | | 150 | \$897 | 2 |
| | Circ.Water System Foundations | | 1,570 | 2,783 | 195 | | \$4,547 | 364 | | 1,473 | \$6,384 | 16 |
| | SUBTOTAL 9 | \$7,623 | \$3,966 | \$7,208 | \$505 | | \$19,301 | \$1,544 | | \$3,718 | \$24,563 | 62 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | s | • | | | | | | | | | |
| 10.1 | Ash Coolers | N/A | | N/A | | | | | | | | |
| 10.2 | Cyclone Ash Letdown | N/A | | N/A | | | | | | | | |
| 10.3 | HGCU Ash Letdown | N/A | | N/A | | | | | | | | |
| 10.4 | High Temperature Ash Piping | N/A | | N/A | | | | | | | | |
| 10.5 | Other Ash Recovery Equipment | N/A | | N/A | | | | | | | | |
| | Ash Storage Silos | 173 | | 576 | 40 | | \$789 | 63 | | 128 | | 2 |
| | Ash Transport & Feed Equipment | 5,852 | | 10,337 | 724 | | \$16,913 | 1,353 | | 2,740 | \$21,006 | 53 |
| 10.8 | Misc. Ash Handling Equipment | | | | | | | | | | | |
| 10.9 | Ash/Spent Sorbent Foundation | | 80 | 105 | 7 | | \$192 | 15 | | 62 | | 1 |
| | SUBTOTAL 10 | \$6,025 | \$80 | \$11,018 | \$771 | | \$17,893 | \$1,431 | | \$2,930 | \$22,254 | 56 |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98
Project: Market Based Advanced Coal Power Systems 14-Aug-98
07:54 AM

TOTAL PLANT COST SUMMARY

Case: Subcritical PC

 Plant Size:
 397.5 MW,net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998
 (\$x1000)

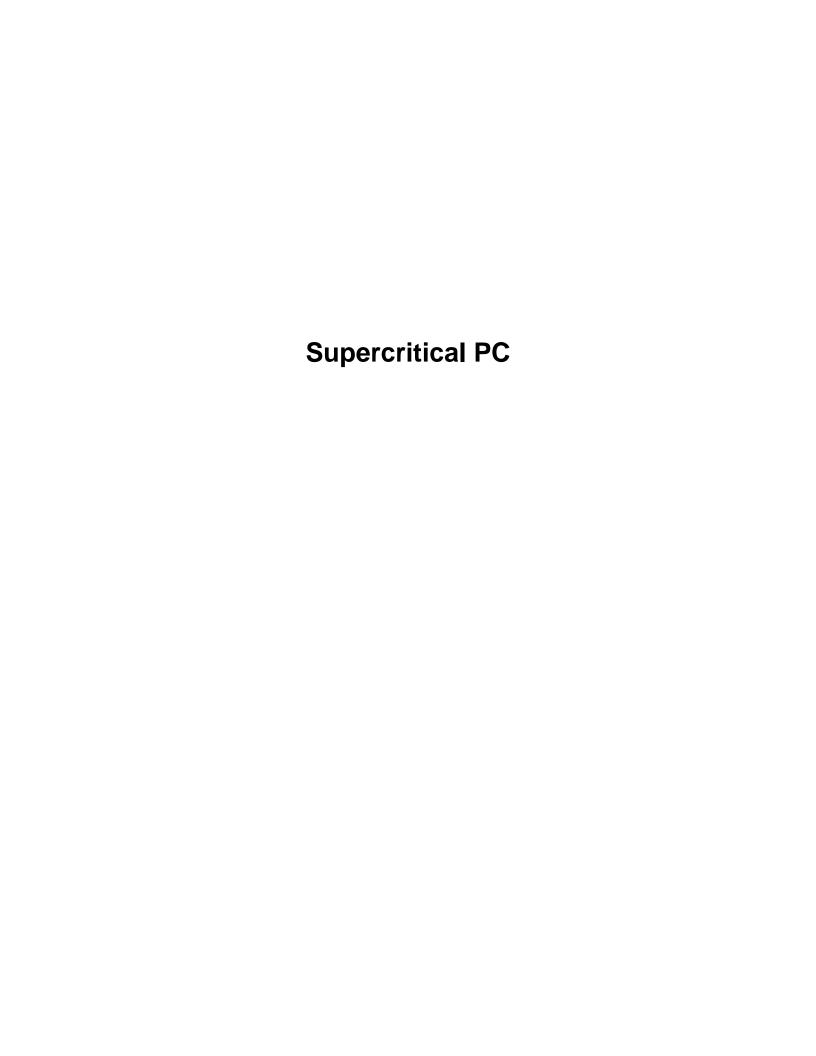
| | | | , | | nate Type. | | | | , | | (4 | |
|------|--------------------------------|-----------|---------------------------|-----------|------------|-------|--------------|-----------|-----------|----------|---------------|-------|
| Acct | | Equipment | Material | Lal | oor | Sales | Bare Erected | Eng'g CM | Continger | ncies | TOTAL PLANT | COST |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | | | | - | | |
| 11.1 | Generator Equipment | 988 | | 157 | 11 | | \$1,156 | 93 | | 125 | \$1,374 | 3 |
| 11.2 | Station Service Equipment | 2,678 | | 861 | 60 | | \$3,599 | 288 | | 389 | \$4,276 | 11 |
| 11.3 | Switchgear & Motor Control | 2,135 | | 355 | 25 | | \$2,515 | 201 | | 407 | \$3,123 | 8 |
| 11.4 | Conduit & Cable Tray | | 1,287 | 4,039 | 283 | | \$5,609 | 449 | | 1,211 | \$7,269 | 18 |
| 11.5 | Wire & Cable | | 1,382 | 1,380 | 97 | | \$2,858 | 229 | | 617 | \$3,704 | 9 |
| 11.6 | Protective Equipment | 105 | | 351 | 25 | | \$481 | 38 | | 78 | \$598 | 2 |
| 11.7 | Standby Equipment | 654 | | 15 | 1 | | \$669 | 54 | | 108 | \$831 | 2 |
| 11.8 | Main Power Transformers | 2,535 | | 117 | 8 | | \$2,660 | 213 | | 431 | \$3,304 | 8 |
| 11.9 | Electrical Foundations | | 161 | 445 | 31 | | \$637 | 51 | | 206 | \$894 | 2 |
| | SUBTOTAL 11. | \$9,095 | \$2,830 | \$7,720 | \$540 | | \$20,185 | \$1,615 | | \$3,574 | \$25,373 | 64 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| 12.1 | PC Control Equipment | w/12.7 | | w/12.7 | | | | | | | | |
| 12.2 | Combustion Turbine Control | N/A | | N/A | | | | | | | | |
| 12.3 | Steam Turbine Control | w/8.1 | | w/8.1 | | | | | | | | |
| 12.4 | Other Major Component Control | | | | | | | | | | | |
| 12.5 | Signal Processing Equipment | W/12.7 | | w/12.7 | | | | | | | | |
| 12.6 | Control Boards, Panels & Racks | 115 | | 67 | 5 | | \$186 | 15 | | 40 | \$242 | 1 |
| 12.7 | Computer & Accessories | 3,656 | | 134 | 9 | | \$3,799 | 304 | | 410 | \$4,513 | 11 |
| 12.8 | Instrument Wiring & Tubing | 1,426 | | 4,431 | 310 | | \$6,167 | 493 | | 1,332 | \$7,993 | 20 |
| 12.9 | Other I & C Equipment | 841 | | 374 | 26 | | \$1,241 | 99 | | 134 | \$1,474 | 4 |
| | SUBTOTAL 12. | \$6,037 | | \$5,006 | \$350 | | \$11,393 | \$911 | | \$1,917 | \$14,222 | 36 |
| 13 | IMPROVEMENTS TO SITE | | | | | | | | | | | |
| 13.1 | Site Preparation | | 31 | 625 | 44 | | \$700 | 56 | | 227 | \$983 | 2 |
| 13.2 | Site Improvements | | 1,044 | 1,289 | 90 | | \$2,423 | 194 | | 785 | \$3,402 | 9 |
| 13.3 | Site Facilities | 1,871 | | 1,834 | 128 | | \$3,833 | 307 | | 1,242 | \$5,382 | 14 |
| | SUBTOTAL 13. | \$1,871 | \$1,076 | \$3,747 | \$262 | | \$6,957 | \$557 | | \$2,254 | \$9,767 | 25 |
| 14 | BUILDINGS & STRUCTURES | | | | | | | | | | | |
| 14.1 | Boiler Building | | 10,880 | 11,399 | 798 | | \$23,077 | 1,846 | | 6,231 | \$31,154 | 78 |
| 14.2 | Turbine Building | | 3,304 | 5,241 | 367 | | \$8,912 | 713 | | 2,406 | \$12,031 | 30 |
| 14.3 | Administration Building | | 323 | 407 | 28 | | \$758 | 61 | | 205 | \$1,023 | 3 |
| 14.4 | Circulation Water Pumphouse | | 23 | 22 | 2 | | \$47 | 4 | | 13 | \$63 | 0 |
| | Water Treatment Buildings | | 225 | 220 | 15 | | \$461 | 37 | | 124 | \$622 | 2 |
| 14.6 | Machine Shop | | 288 | 230 | 16 | | \$534 | 43 | | 144 | \$721 | 2 |
| | Warehouse | | 195 | 233 | 16 | | \$445 | 36 | | 120 | \$600 | 2 |
| | Other Buildings & Structures | | 120 | 121 | 8 | | \$249 | 20 | | 67 | \$337 | 1 |
| 14.9 | Waste Treating Building & Str. | | 229 | 828 | 58 | | \$1,114 | 89 | | 301 | \$1,504 | 4 |
| | SUBTOTAL 14. | | \$15,586 | \$18,701 | \$1,309 | | \$35,597 | \$2,848 | | \$9,611 | \$48,055 | 121 |
| | TOTAL COST | \$198,778 | \$26,247 | \$126,383 | \$8,847 | | \$360,255 | \$28,820 | | \$59,765 | \$448,840 | 1129 |
| | TOTAL COST | ψ130,110 | ψ ∠ U, ∠ +1 | ψ120,303 | φυ,υ47 | | φυσυ,200 | ψ20,020 | | ψυσ, ευυ | ψ | 1143 |

| Subcritical PC | |
|--|--|
| Item/Description | Contingency Factors(%) <u>%Process</u> <u>%Project</u> |
| COAL & SORBENT HANDLING | 20.0 |
| COAL & SORBENT PREP & FEED | 20.0 |
| FEEDWATER & MISC. BOP SYSTEMS | 23.7 |
| PC BOILER & ACCESSORIES | |
| PC Boiler | 10.0 |
| Open | |
| Open | |
| Boiler BoP (w/FD & ID Fans) | 10.0 |
| FLUE GAS CLEANUP | 10.0 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | |
| Combustion Turbine Accessories | |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | |
| HRSG Accessories, Ductwork and Stack | 15.5 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 10.0 |
| Turbine Plant Auxiliaries and Steam Piping | 17.2 |
| COOLING WATER SYSTEM | 17.8 |
| ASH/SPENT SORBENT HANDLING SYS | 15.2 |
| ACCESSORY ELECTRIC PLANT | 16.4 |
| INSTRUMENTATION & CONTROL | 15.6 |
| IMPROVEMENTS TO SITE | 30.0 |
| BUILDINGS & STRUCTURES | 25.0 |
| | |

| OPERATING LABOR REQUIREMENTS | | | | | | | | | |
|--|-----------------------|--------------|--|--|--|--|--|--|--|
| Subcritical PC | | | | | | | | | |
| Operating Labor Rate(base): | 25.89 \$/hour | | | | | | | | |
| Operating Labor Burden: | 30.00 % of bas | е | | | | | | | |
| Labor O-H Charge Rate: | 25.00 % of laboration | or | | | | | | | |
| Operating Labor Requirements(O.J.)per Shift: | | Total | | | | | | | |
| Category | 1 unit/mod. | <u>Plant</u> | | | | | | | |
| Skilled Operator | 2.0 | 2.0 | | | | | | | |
| Operator | 9.0 | 9.0 | | | | | | | |
| Foreman | 1.0 | 1.0 | | | | | | | |
| Lab Tech's, etc. | <u>2.0</u> | <u>2.0</u> | | | | | | | |
| TOTAL-O.J.'s | 14.0 | 14.0 | | | | | | | |

| CONSUMABLES, BY-PRO Subcritical PC | DUCTS & FUELS DATA | | |
|---|--------------------|------------|------------------------|
| Subcritical i S | Consum | nption | Unit |
| Item/Description | _Initial | /Day | _Cost_ |
| Water(/1000 gallons) | | 5,475 | 0.80 |
| Chemicals* MU & WT Chem.(lbs)** | 397,544 | 13,251 | 0.16 |
| Limestone (ton)** Formic Acid (lb) Ammonia (NH3) ton | 11,919 | 397.3 | 16.25 0.60 32.00 |
| Other Supplemental Fuel(MBtu)** SCR Catalyst Replacement L.P. Steam(/1000 pounds) | | | 1.00 |
| Waste Disposal Sludge(ton) Ash(ton) | | 833 371 | 10.00 |
| By-products & Emissions Total By-products | | | |
| Fuel(ton) | | 3,711 | 29.29 |

| Subcritical PC | MAINTENANCE FACTORS | |
|------------------|-----------------------------|------------------|
| Item/Description | | Maintenance % |
| | | |
| COAL & SORBE | ENT HANDLING | 2.1 |
| COAL & SORBE | ENT PREP & FEED | 3.7 |
| FEEDWATER 8 | MISC. BOP SYSTEMS | 2.3 |
| PC BOILER & A | CCESSORIES | |
| PC Boiler | | 3.5 |
| Open | | |
| Open | | |
| Boiler BoP (w/FI | D & ID Fans) | 4.5 |
| FLUE GAS CLE | ANUP | 3.4 |
| COMBUSTION | TURBINE/ACCESSORIES | |
| Combustion Turk | bine Generator | |
| Combustion Turk | bine Accessories | |
| HRSG, DUCTIN | IG & STACK | |
| Heat Recovery S | Steam Generator | |
| HRSG Accessor | ries, Ductwork and Stack | 1.0 |
| STEAM TURBIN | NE GENERATOR | |
| Steam TG & Acc | cessories | |
| Turbine Plant Au | uxiliaries and Steam Piping | 3.8 |
| COOLING WAT | ER SYSTEM | 1.2 |
| ASH/SPENT SC | ORBENT HANDLING SYS | 3.0 |
| ACCESSORY E | LECTRIC PLANT | 1.3 |
| INSTRUMENTA | ATION & CONTROL | 1.6 |
| IMPROVEMENT | TS TO SITE | 0.6 |
| BUILDINGS & S | STRUCTURES | 1.4 |



| Engineering(Incl.C.M.,H.O.& Fee) Process Contingency Project Contingency Project Contingency TOTAL PLANT COST(TPC) TOTAL CASH EXPENDED AFDC TOTAL PLANT INVESTMENT(TPI) Royalty Allowance Preproduction Costs TOTAL Capital 4,231 10. Initial Catalyst & Chemicals (w/equip.) Land Cost TOTAL CAPITAL REQUIREMENT(TCR) S12,392 30. Inventory Capital 4,231 10. Initial Catalyst & Chemicals (w/equip.) Land Cost TOTAL CAPITAL REQUIREMENT(TCR) S512,167 1274. OPERATING & MAINTENANCE COSTS (1998 Dollars) TOTAL OPERATION & MAINTENANCE 1,1569 3. Administrative & Support Labor 1,569 3. TOTAL OPERATION & MAINTENANCE \$11,064 2.7. FIXED O & M VARIABLE O & M VARIABLE O & M CONSUMABLE OPERATING COSTS, less Fuel (1998 Dollars) Waster Disposal TOTAL CONSUMABLE OPERATING COSTS S1,098 Dollars) TOTAL CONSUMABLE OPERATING COSTS S2,176 1.0 CONSUMABLE O & M CONSUMABLE OPERATION & Dollars) TOTAL CONSUMABLE OPERATING COSTS S8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) TOTAL PRODUCTION COST 1,644 1,647 | CAPITAL INVESTMENT & I | REVENUE RE | QUIREME | NT SUMMAR | RY | | | |
|---|---|---|-----------|---------------|--------------|--------------|--|------|
| Plant Size: | TITLE/DEFINITION | | | | | | | |
| Primary/Secondary Fuel(type): Illnois #6 Cost: 1.26 (KMMBtu) Design/Construction: 3 (years) BookLife: 20 (years) TPC/Plant Cost) Year: 2005 (Jan.) Process Capital & Facilities 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 945. 379,761 | | | | | | | | |
| Design/Construction: 3 (years) BookLife: 200 (years) 1988 (Jan.) TPI Year: 2005 (Jan.) TPI PCPIPIANT COSTY STRUCTION: 85 (%) STRUCTION: 85 (%) STRUCTION: STRUCTI | | | MW,net) | | | | | |
| TPC Plant Cost) Year: | | | \(\coro\) | | | · · / | | |
| Capacity Factor: 85 (%) | | | | | | | | |
| CAPITAL INVESTMENT \$x1000 \$3kW Process Capital & Facilities 379,761 945. Engineering(incl C. M., H.O. & Fee) 30,381 75. Process Contingency 61,347 152. Project Contingency \$471,489 1173. TOTAL CASH EXPENDED \$471,489 1173. AFDC \$23,575 \$495,064 1232. Royalty Allowance 12,392 30. Preproduction Costs 12,392 30. Inventory Capital 4,231 10. Inventory Capital 4,231 10. Inventory Capital 4,231 10. TOTAL CAPITAL REQUIREMENT(TCR) \$512,167 1274. OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor 4,127 10. Maintenance Material 3,221 8. Administrative & Support Labor 1,569 3. TOTAL OPERATION & MAINTENANCE \$11,064 27. FIXED O & M 23,41 \$/kW-yr 0.06 ¢/kWh | | | , | ii i i cai. | 2003 | (Jan.) | | |
| Process Capital & Facilities | Oupuony : asion | | ,,,, | | | | | |
| Engineering(Incl.C.M.,H.O.& Fee) Procest Contingency Project Conti | | | | | | <u>\$/kW</u> | | |
| Process Contingency 61,347 152. TOTAL PLANT COST(TPC) TOTAL CASH EXPENDED AFDC TOTAL CASH EXPENDED AFDC TOTAL PLANT INVESTMENT(TPI) \$471,489 1173. Royalty Allowance Preproduction Costs Inventory Capital Initial Catalyst & Chemicals(w/equip.) Land Cost 12,392 30. Inventory Capital Initial Catalyst & Chemicals(w/equip.) Land Cost 480 1. OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$kW-yr Operating Labor Maintenance Labor 4,127 10. Maintenance Material Administrative & Support Labor 3,221 8. Administrative & Support Labor \$1,569 3. TOTAL OPERATION & MAINTENANCE \$11,064 27. FIXED O & M 23,411 \$k/kW-yr 4.247 0.0 CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$1,247 0.0 6/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$3,036 0.1 0.0 6/kWh CONSUMABLE OPERATING COSTS, less Fuel (1998 Dollars) \$2,109 9.0 0.0 6/kWh CONSUMABLE OPERATING COSTS (1998 Dollars) \$3,345 0.1 0.0 0.0 0.0 0.0 </td <td></td> <td></td> <td></td> <td>,</td> <td></td> <td>945.1</td> | | | | , | | 945.1 | | |
| Project Contingency | | | | 30,381 | | 75.6 | | |
| TOTAL PLANT COST(TPC) | | | | 64 247 | | 150.7 | | |
| TOTAL CASH EXPENDED \$471,488 AFDC \$23,575 \$495,064 1232. | Project Contingency | | | 01,347 | | 152.7 | | |
| TOTAL CASH EXPENDED \$471,488 AFDC \$23,575 \$495,064 1232. | TOTAL PLANT COST(TPC) | | | \$471,489 | | 1173.4 | | |
| AFDC TOTAL PLANT INVESTMENT (TPI) \$495,064 1232. Royalty Allowance Preproduction Costs 12,392 30. Inventory Capital 4,231 10. Initial Catalyst & Chemicals (w/equip.) 480 1. TOTAL CAPITAL REQUIREMENT (TCR) \$512,167 1274. OPERATING & MAINTENANCE COSTS (1998 Dollars) \$100 \$1,000 \$1 | | | \$471.489 | Ψ1.1,100 | | 1170.1 | | |
| Royalty Allowance | | | | | | | | |
| Preproduction Costs 12,392 30. Inventory Capital | TOTAL PLANT INVESTMENT(TPI) | | | \$495,064 | | 1232.0 | | |
| Preproduction Costs 12,392 30. Inventory Capital | | | | | | | | |
| Inventory Capital 1,231 10. | Royalty Allowance | | | 40.000 | | 20.0 | | |
| Initial Catalyst & Chemicals (w/equip.) 480 1. TOTAL CAPITAL REQUIREMENT (TCR) \$512,167 1274. OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$k/kw-yr Operating Labor 4,127 10. Maintenance Labor 2,147 5. Maintenance Material 3,221 8. Administrative & Support Labor \$11,064 27. FIXED O & M \$11,064 27. FIXED O & M \$11,064 27. VARIABLE O & M \$11,064 27. CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$1000 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$1,247 0.0 Chemicals 3,308 0.1 Other Consumables 3,345 0.1 By-PRODUCT CREDITS (1998 Dollars) \$32,176 1.0 PRODUCTION COST (1998 Dollars) \$32,176 1.0 PRODUCTION COST SUMMARY \$2,4kW-yr \$3,4kW-yr 0.31 Fixed O & M 23.4/kW-yr 0.31 2.4/kWh Variable O | | | | | | | | |
| Land Cost 480 1. TOTAL CAPITAL REQUIREMENT (TCR) \$512,167 1274. OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor 4,127 10. Maintenance Material 3,221 8. Administrative & Support Labor 1,569 3. TOTAL OPERATION & MAINTENANCE \$11,064 27. FIXED O & M 23.41 \$/kW-yr √kWh VARIABLE O & M 0.06 ¢/kWh 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Waster Disposal 3,308 0.1 Other Consumables 3,345 0.1 Waste Disposal 1,093 0.0 TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) \$32,176 1.0 PRODUCTION COST SUMMARY \$21,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 \$2,000 | | | | 4,231 | | 10.5 | | |
| TOTAL CAPITAL REQUIREMENT(TCR) \$512,167 1274. | | | | 480 | | 1.2 | | |
| OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor 4,127 10. Maintenance Labor 2,147 5. Maintenance Material 3,221 8. Administrative & Support Labor 1,569 3. TOTAL OPERATION & MAINTENANCE \$11,064 27. FIXED O & M 23.41 \$/kW-yr VARIABLE O & M 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Water 1,247 0.0 0.0 Chemicals 3,008 0.1 Other Consumables 3,345 0.1 Waste Disposal 1,093 0.0 TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) \$32,176 1.0 PRODUCTION COST SUMMARY \$2,4/kW-yr 0.31 2.34/kW-yr 0.31 Variable O & M 0.06 0.06 0.06 0.06 Consumables 0.29 0.29 0.29 By-product Credit 0.08< | | | | | | | | |
| Operating Labor 4,127 10. | TOTAL CAPITAL REQUIREMENT(TCR | | \$512,167 | | 1274.6 | | | |
| Operating Labor 4,127 10. | OPERATING & MAINTENANCE COSTS (1998 D | ollars) | | \$x1000 | | \$/kW-vr | | |
| Maintenance Labor 2,147 5. Maintenance Material 3,221 8. Administrative & Support Labor 1,569 3. TOTAL OPERATION & MAINTENANCE \$11,064 27. FIXED O & M 23.41 \$/kW-yr VARIABLE O & M 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Water 1,247 0.0 Chemicals 3,008 0.1 Other Consumables 3,345 0.1 Waste Disposal 1,093 0.0 TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) FUEL COST (1998 Dollars) \$32,176 1.0 PRODUCTION COST SUMMARY \$2.4/kW-yr 0.31 2.4/kW-yr 0.31 Fixed O & M 0.06 0.06 0.06 0.06 0.06 Consumables 0.29 0.29 0.29 0.93 TOTAL PRODUCTION COST 1.59 1.59 <td <="" colspan="2" td=""><td></td><td>,</td><td></td><td></td><td></td><td>10.3</td></td> | <td></td> <td>,</td> <td></td> <td></td> <td></td> <td>10.3</td> | | | , | | | | 10.3 |
| Administrative & Support Labor TOTAL OPERATION & MAINTENANCE FIXED O & M VARIABLE O & M CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) Water Chemicals Other Consumables TOTAL CONSUMABLE OPERATING COSTS **8,693** **1,247** O.0 Chemicals 3,008 0.1 Other Consumables 3,345 0.1 Waste Disposal TOTAL CONSUMABLE OPERATING COSTS **8,693** **0.2 **BY-PRODUCT CREDITS (1998 Dollars) **FUEL COST (1998 Dollars) **532,176** **100 **PRODUCTION COST SUMMARY** Fixed O & M Variable O & M Consumables O.29 By-product Credit Fuel TOTAL PRODUCTION COST 1.64** **172.1/kW-yr 172.1/kW-yr 2.31 **INW-yr 1.59** **11,064** 27. **2 **A*W-yr O.06 **C/kWh 23.4/kW-yr O.31 **2 **A*W-yr O.31 **C/kWh 23.4/kW-yr O.31 **A*W-yr O.31 ** | Maintenance Labor | | | 2,147 | | 5.3 | | |
| TOTAL OPERATION & MAINTENANCE \$11,064 27. FIXED O & M 23.41 \$/kW-yr VARIABLE O & M 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Water 1,247 0.0 Chemicals 3,045 0.1 Other Consumables 3,345 0.1 Waste Disposal 1,093 0.0 TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$32,176 1.0 PRODUCTION COST SUMMARY Fixed O & M 23.4/kW-yr 0.31 2.4/kW-yr 0.31 2.4/kW-yr 0.31 2.4/kW-yr 0.31 0.06 Consumables 0.29 By-product Credit Fuel 0.98 TOTAL PRODUCTION COST 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | Maintenance Material | | | 3,221 | | 8.0 | | |
| FIXED O & M VARIABLE O & M CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) Water | Administrative & Support Labor | | | 1,569 | | 3.9 | | |
| VARIABLE O & M CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) Water Chemicals Other Consumables Other Consumables Other Consumables TOTAL CONSUMABLE OPERATING COSTS BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) FUEL COST (1998 Dollars) S32,176 1.00 PRODUCTION COST SUMMARY Fixed O & M Variable O & M Consumables Oconsumables Oconsu | TOTAL OPERATION & MAINTENANCE | Ē | | \$11,064 | | 27.5 | | |
| CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Water 1,247 0.0 Chemicals 3,008 0.1 Other Consumables 3,345 0.1 Waste Disposal 1,093 0.0 TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$\$\frac{1205 \text{ \$\sqrt{\text{S}}\text{Wh}}{\text{c/kWh}}\$ \$\$\frac{\text{c/kWh}}{\text{c/kWh}}\$ PRODUCTION COST SUMMARY \$\$\frac{1205 \text{ \$\sqrt{\text{S}}\text{Wh}}{\text{c/kWh}}\$ \$\$\frac{\text{c/kWh}}{23.4/kW-yr}\$ \$\$\frac{\text{c/kWh}}{23.4/kW-yr}\$ \$\$\frac{\text{c/kWh}}{23.4/kW-yr}\$ \$\$\frac{0.06}{0.06}\$ \$\$\frac{0.93}{0.93}\$ | FIXED O & M | | | | 23.41 | \$/kW-yr | | |
| Water 1,247 0.00 Chemicals 3,008 0.11 Other Consumables 3,345 0.1 Waste Disposal 1,093 0.00 TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$\frac{1}{2}\text{Year (2005 \$)}\$ Levelized (10th.Year \$) PRODUCTION COST SUMMARY \$\frac{1}{2}\text{KWh}\$ 23.4/kW-yr 0.31 23.4/kW-yr 0.93 0.93 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | VARIABLE O & M | | | | 0.06 | ¢/kWh | | |
| Water 1,247 0.00 Chemicals 3,008 0.11 Other Consumables 3,345 0.1 Waste Disposal 1,093 0.00 TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$\frac{1}{2}\text{Year (2005 \$)}\$ Levelized (10th.Year \$) PRODUCTION COST SUMMARY \$\frac{1}{2}\text{KWh}\$ 23.4/kW-yr 0.31 23.4/kW-yr 0.93 0.93 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | CONSUMABLE OPERATING COSTS.less Fuel | (1998 Dollars) | ı | \$x1000 | | ¢/kWh | | |
| Other Consumables 3,345 0.1 Waste Disposal 1,093 0.0 TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 BY-PRODUCT CREDITS (1998 Dollars) \$32,176 1.0 PRODUCTION COST SUMMARY 1st Year (2005 \$) Levelized (10th.Year \$) Fixed O & M 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 Consumables 0.29 0.29 By-product Credit 0.98 0.93 TOTAL PRODUCTION COST 1.64 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | | (· · · · · · · · · · · · · · · · · · · | | | | 0.04 | | |
| TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.2 | Chemicals | | | 3,008 | | 0.10 | | |
| TOTAL CONSUMABLE OPERATING COSTS \$8,693 0.22 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$32,176 1.00 PRODUCTION COST SUMMARY Fixed O & M 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.29 By-product Credit Fuel 0.98 0.99 0.29 TOTAL PRODUCTION COST 1.64 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | | | | | | 0.11 | | |
| ## BY-PRODUCT CREDITS (1998 Dollars) ### FUEL COST (1998 Dollars) ### PRODUCTION COST SUMMARY Fixed O & M | Waste Disposal | | | 1,093 | | 0.04 | | |
| FUEL COST (1998 Dollars) \$32,176 1.06 PRODUCTION COST SUMMARY Fixed O & M Variable O & M Consumables By-product Credit Fuel TOTAL PRODUCTION COST Levelized (10th. Year \$) ¢/kWh 23.4/kW-yr 0.31 23.4/kW-yr 0.36 0.06 0.29 0.29 0.29 0.29 TOTAL PRODUCTION COST 1.64 172.1/kW-yr 2.31 | TOTAL CONSUMABLE OPERATING C | OSTS | | \$8,693 | | 0.29 | | |
| St Year (2005 \$) Levelized (10th.Year \$) | BY-PRODUCT CREDITS (1998 Dollars) | | | | | | | |
| PRODUCTION COST SUMMARY ¢/kWh ¢/kWh Fixed O & M 23.4/kW-yr 0.31 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 0.06 Consumables 0.29 0.29 By-product Credit 0.98 0.93 TOTAL PRODUCTION COST 1.64 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | FUEL COST (1998 Dollars) | | | \$32,176 | | 1.08 | | |
| PRODUCTION COST SUMMARY ¢/kWh ¢/kWh Fixed O & M 23.4/kW-yr 0.31 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 0.06 Consumables 0.29 0.29 By-product Credit 0.98 0.93 TOTAL PRODUCTION COST 1.64 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | | 1st Year / | 2005 \$\ | l eveli | ized (10th V | ear \$\ | | |
| Fixed O & M 23.4/kW-yr 0.31 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 Consumables 0.29 0.29 By-product Credit Fuel 0.98 0.98 0.93 1.64 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | PRODUCTION COST SUMMARY | <u> (Cai (</u> | | | | | | |
| Consumables 0.29 0.29 By-product Credit 0.98 0.93 Fuel 0.98 0.93 TOTAL PRODUCTION COST 1.64 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | | 23.4/kW-yr | | | | | | |
| By-product Credit | Variable O & M | | 0.06 | | 0.06 | | | |
| Fuel 0.98 0.93 TOTAL PRODUCTION COST 1.64 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | | | 0.29 | | 0.29 | | | |
| TOTAL PRODUCTION COST 1.64 1.59 LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | , , | | | | | | | |
| LEVELIZED CARRYING CHARGES(Capital) 172.1/kW-yr 2.31 | | - | | - | | | | |
| | | | 1.04 | 470 4//484 | | | | |
| LEVELIZED (10th Year) RUSBAR COST OF POWER | LEVELIZED CARKTING CHARGES(Capital) | | | 172.1/kW-yr | 2.31 | | | |
| ELTELECTION (1601) BOODAN COST OF TOTALS | LEVELIZED (10th. Year) BUSBAR COST OF PO | WER | | | 3.90 | | | |

| ESTIMATE BASIS/FINANCIAL CRITER | RIA for REVENUE REQUIREMENT CALCULATIONS |
|---|---|
| GENERAL DATA/CHARACTERISTICS | |
| Case Title: | Supercritical PC |
| Unit Size:/Plant Size: | 401.8 MW,net 401.8 MWe |
| Location: | Middletown, USA |
| Fuel: Primary/Secondary | Illnois #6 |
| Energy From Primary/Secondary Fuels | 8,568 Btu/kWh Btu/kWh |
| Levelized Capacity Factor / Preproduction(equival | lent months): 85 % 1 months |
| Capital Cost Year Dollars (Reference Year Dollars | s): 1998 (January) |
| Delivered Cost of Primary/Secondary Fuel | 1.26 \$/MBtu \$/MBtu |
| Design/Construction Period: | 3 years |
| Plant Startup Date (1st. Year Dollars): | 2005 (January) |
| Land Area/Unit Cost | 320 acre \$1,500 /acre |
| FINANCIAL CRITERIA | |
| Project Book Life: | 20 years |
| Book Salvage Value: | % |
| Project Tax Life: | 20 years |
| Tax Depreciation Method: | Accel. based on ACRS Class |
| Property Tax Rate: | 1.0 % per year |
| Insurance Tax Rate: | 1.0 % per year |
| Federal Income Tax Rate: | 34.0 % |
| State Income Tax Rate: | 6.0 % |
| Investment Tax Credit/% Eligible | % % |
| Economic Basis: | 10th.Year Constant Dollars |
| Capital Structure Common Equity Preferred Stock | <u>% of Total</u> <u>Cost(%)</u> 20 16.5 |
| Debt Weighted Cost of Capital:(after tax) | 80 5.8 6.2 % |
| Escalation Rates | Over Book Life 1998 to 2005 General % per year % per year Primary Fuel -1.1 % per year -1.36 % per year Secondary Fuel 1.2 % per year 0.041 % per year |

Client: DEPARTMENT OF ENERGY 14-Aug-98 Report Date: Project: Market Based Advanced Coal Power Systems 08:20 AM

TOTAL PLANT COST SUMMARY

Case:

Supercritical PC 401.8 MW,net Plant Size: Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| | Tidit Oize. | | Latinate Type. Conceptual | | | | (ψχτουο) | | | | |
|------|---|-----------------------------------|---------------------------|------------------------------|------------------------|-----|---|--------------------------------|-------------------------|----------------------------------|-------------------------|
| Acct | | Equipment | Material | Lak | | | Bare Erected | | Contingencies | TOTAL PLANT | |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | 6,782 | 2,004 | 5,174 | 362 | | \$14,321 | 1,146 | 3,093 | \$18,560 | 46 |
| 2 | COAL & SORBENT PREP & FEED | 8,458 | | 2,633 | 184 | | \$11,275 | 902 | 2,435 | \$14,613 | 36 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 16,550 | | 7,175 | 502 | | \$24,227 | 1,938 | 6,139 | \$32,304 | 80 |
| 4.2 | PC BOILER & ACCESSORIES PC Boiler Open Open | 60,723 | | 23,331 | 1,633 | | \$85,688 | 6,855 | 9,254 | \$101,797 | 253 |
| | Boiler BoP (w/FD & ID Fans) SUBTOTAL 4 | 3,163 <i>63,886</i> | | 1,042 24,373 | 73 <i>1,706</i> | | \$4,278 <i>\$89,966</i> | 342 7,197 | 462 9,716 | | 13 266 |
| 5 | FLUE GAS CLEANUP | 33,591 | | 18,834 | 1,168 | | \$53,593 | 4,287 | 5,433 | \$63,314 | 158 |
| | COMBUSTION TURBINE/ACCESSORIE Combustion Turbine Generator Combustion Turbine Accessories SUBTOTAL 6 | N/A | | N/A | | | | | | | |
| | HRSG, DUCTING & STACK Heat Recovery Steam Generator HRSG Accessories, Ductwork and Stack SUBTOTAL 7 | N/A 9,491 9,491 | 280 280 | N/A 7,038 <i>7,038</i> | 493 493 | | \$17,302 \$17,302 | 1,384 <i>1,384</i> | 2,897 2,897 | \$21,583 \$21,583 | 54 54 |
| | STEAM TURBINE GENERATOR Steam TG & Accessories Turbine Plant Auxiliaries and Steam Piping SUBTOTAL 8 | 33,394 11,839 <i>45,234</i> | 361 <i>361</i> | 5,502 6,493 11,995 | 385 455 840 | | \$39,281 \$19,147 <i>\$58,429</i> | 3,143 1,532 <i>4,674</i> | 4,242 3,561 7,803 | \$46,666 \$24,240 \$70,906 | 116 60 <i>176</i> |
| 9 | COOLING WATER SYSTEM | 7,685 | 3,998 | 7,266 | 509 | | \$19,457 | 1,557 | 3,748 | \$24,761 | 62 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | 5,859 | 77 | 10,715 | 750 | | \$17,402 | 1,392 | 2,849 | \$21,643 | 54 |
| 11 | ACCESSORY ELECTRIC PLANT | 9,175 | 2,859 | 7,797 | 546 | | \$20,376 | 1,630 | 3,608 | \$25,614 | 64 |
| 12 | INSTRUMENTATION & CONTROL | 6,114 | | 5,069 | 355 | | \$11,538 | 923 | 1,941 | \$14,401 | 36 |
| 13 | IMPROVEMENTS TO SITE | 1,882 | 1,082 | 3,768 | 264 | | \$6,995 | 560 | 2,266 | \$9,821 | 24 |
| 14 | BUILDINGS & STRUCTURES | | 15,275 | 18,323 | 1,283 | | \$34,881 | 2,790 | 9,418 | \$47,090 | 117 |
| | TOTAL COST | \$214,705 | \$25,935 | \$130,160 | \$8,961 | | \$379,761 | \$30,381 | \$61,347 | \$471,489 | 1173 |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98 08:20 AM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Case:

Supercritical PC 401.8 MW,net Plant Size: Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| Acct | | Equipment | Material | Lab | or | Sales | Bare Erected | Engia CM | Contingencies | | TOTAL PLANT | COST |
|------|---|----------------|----------|-----------------|------------------|-------|--------------|-------------|---------------|----------------|----------------|-------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | | 0001 | Direct | mancot | iux | 000t ¢ | 11.0.0 1 00 | 1100000 | 110,000 | T | Ψ |
| 1 11 | Coal Receive & Unload | 1.662 | | 914 | 64 | | \$2.640 | 211 | | 570 | \$3,421 | 9 |
| | Coal Stackout & Reclaim | 2.147 | | 586 | 41 | | \$2,775 | 222 | | 599 | \$3,596 | 9 |
| | Coal Conveyors & Yd Crush | 1,996 | | 580 | 41 | | \$2,617 | 209 | | 565 | \$3,392 | 8 |
| | Other Coal Handling | 522 | | 134 | 9 | | \$666 | 53 | | 144 | \$863 | 2 |
| | Sorbent Receive & Unload | 67 | | 24 | 2 | | \$93 | 7 | | 20 | \$121 | 0 |
| | Sorbent Stackout & Reclaim | | | | _ | | , | • | | | Ų.Z. | |
| | Sorbent Conveyors | 387 | | 114 | 8 | | \$509 | 41 | | 110 | \$660 | 2 |
| | Other Sorbent Handling | 007 | | | Ü | | ΨΟΟΟ | | | 110 | φοσο | - |
| | Coal & Sorbent Hnd.Foundations | | 2,004 | 2,820 | 197 | | \$5,021 | 402 | | 1,085 | \$6,507 | 16 |
| | SUBTOTAL 1. | \$6,782 | \$2,004 | \$5,174 | \$362 | | \$14,321 | \$1,146 | | \$3,093 | \$18,560 | 46 |
| 2 | COAL & SORBENT PREP & FEED | 40,702 | Ψ2,004 | ψ0,114 | 4002 | | ψ1-1,021 | Ψ1,140 | | ψ0,000 | ψ10,000 | |
| | Coal Crushing & Drying | 939 | | 221 | 15 | | \$1.175 | 94 | | 254 | \$1,523 | 4 |
| | Coal Conveyor / Storage | 5,560 | | 1.462 | 102 | | \$7,125 | 570 | | 1,539 | \$9,233 | 23 |
| | Coal Injection System | 3,500 | | 1,402 | 102 | | Ψ7,123 | 370 | | 1,555 | ψ3,233 | 20 |
| | Misc.Coal Prep & Feed | | | | | | | | | | | |
| | Sorbent Prep Equipment | 1.809 | | 453 | 32 | | \$2.293 | 183 | | 495 | \$2,972 | 7 |
| | Sorbent Trep Equipment Sorbent Storage & Feed | 150 | | 497 | 35 | | \$682 | 55 | | 147 | \$884 | 2 |
| | Sorbent Injection System | 130 | | 431 | 55 | | Ψ002 | 33 | | 147 | ψ004 | 2 |
| | Booster Air Supply System | | | | | | | | | | | |
| | Coal & Sorbent Feed Foundation | | | | | | | | | | | |
| 2.9 | SUBTOTAL 2. | \$8,458 | | \$2,633 | \$184 | | \$11.275 | \$902 | | \$2,435 | \$14,613 | 36 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | \$0,430 | | Ψ Z ,033 | φ10 4 | | \$11,273 | ψ30Z | | ΨZ,433 | \$14,013 | 30 |
| | FeedwaterSystem | 4,946 | | 1,572 | 110 | | \$6,628 | 530 | | 1,432 | \$8,590 | 21 |
| | Water Makeup & Pretreating | 2,170 | | 767 | 54 | | \$2,991 | 239 | | 969 | \$4,199 | 10 |
| | Other Feedwater Subsystems | 3.804 | | 1.352 | 95 | | \$5.251 | 420 | | 1.134 | \$6.805 | 17 |
| | Service Water Systems | 417 | | 254 | 18 | | \$689 | 55 | | 223 | \$967 | 2 |
| | Other Boiler Plant Systems | 1.921 | | 1.588 | 111 | | \$3,620 | 290 | | 782 | \$4,692 | 12 |
| | FO Supply Sys & Nat Gas | 134 | | 1,366 | 14 | | \$3,020 | 290 | | 74 | \$4,092 | 1 |
| | Waste Treatment Equipment | 1.573 | | 921 | 64 | | \$2.558 | 205 | | 829 | \$3,592 | 9 |
| | Misc. Power Plant Equipment | 1,573 | | 526 | 37 | | \$2,556 | 172 | | 696 | \$3,017 | 8 |
| 3.6 | SUBTOTAL 3. | | | \$7,17 5 | \$502 | | \$24,227 | \$1,938 | | \$6,139 | \$32,304 | 80 |
| 4 | PC BOILER & ACCESSORIES | \$10,550 | | \$7,175 | \$302 | | \$24,221 | \$1,930 | | Ф 0,139 | \$32,304 | 00 |
| | PC Boiler & ACCESSORIES PC Boiler | 60,723 | | 23,331 | 1,633 | | \$85,688 | 6,855 | | 9,254 | \$101,797 | 253 |
| | | 60,723 | | 23,331 | 1,033 | | φου,000 | 6,000 | | 9,254 | \$101,797 | 255 |
| | Open | | | | | | | | | | | |
| | Open | 0.400 | | 4.040 | 70 | | £4.070 | 242 | | 400 | Ф Г 000 | 40 |
| | Boiler BoP (w/FD & ID Fans) | 3,163 w/4.1 | | 1,042 w/4.1 | 73 | | \$4,278 | 342 | | 462 | \$5,082 | 13 |
| | Primary Air System | 1 | | , | | | | | | | | l |
| | Secondary Air System | w/4.1 | | w/4.1 | | | | | | | | l |
| | Major Component Rigging | | | w/4.1 | | | | | | | | ı |
| 4.9 | PC Foundations | | w/14.1 | w/14.1 | 64 700 | | *** | £7.467 | | 60.740 | £400 070 | 200 |
| | SUBTOTAL 4. | \$63,886 | | \$24,373 | \$1,706 | | \$89,966 | \$7,197 | | \$9,716 | \$106,879 | 266 |

Client: DEPARTMENT OF ENERGY

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Case: Supercritical PC

Plant Size: 401.8 MW,net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| Rem/Description | | Plant Size: | 401.8 | ivivv,net | EStin | nate Type: | Conce | piuai | Co | st Base (Jan) | 1998 | (\$X1000) | |
|--|------|----------------------|-----------|-----------|----------|------------|-------|----------------|-----------|---------------|---------|-----------------|-------|
| FLUE GAS CLEANUP | Acct | | Equipment | Material | Lal | oor | Sales | Bare Erected | Eng'g CM | Conting | gencies | TOTAL PLANT | COST |
| 5-1 Absorber Vessels & Accessories | No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 5-1 Absorber Vessels & Accessories | _ | FILLE GAG OL FANILID | | | | | | | | | | | |
| 5.2 Other FGD | | | 40.007 | | 0.005 | 454 | | #40.500 | 4 407 | | 0.007 | #00.000 | |
| 5.3 Bag House & Accessories | | | | | | | | | | | | . , | |
| 5.4 Other Particulate Removal Materials 5.5 Gypsum Devatering System 1,693 4,499 315 5,507 521 703 5,730 19 5.6 Mercury Removal System 1,132 2,150 5.3,283 263 53,545 9 5.9 Open 1,132 2,150 5.9 Open 5.0 Open 5.9 Open 5.0 Open | | | | | | | | | | | | | |
| 5.5 Gypsum Dewatering System | | | | | | | | | | | | | |
| 5.6 Mercury Removal System | | | | | | | | | | | | | |
| SUBTOTAL 5. S33,591 \$18,834 \$1,168 \$53,593 \$4,287 \$5,433 \$63,314 \$158 \$61. Combustion Turbline Generator C2 Combustion Turbline Generator C3 Combustion Turbline Generator C4 Combustion Turbline Generator C5 Combustion Turbline Generator C5 Combustion Turbline Generator C7.2 HRSG, Duct Nine Generator C7.2 HRSG, Duct Nine Generator C7.2 HRSG, Duct Nine Generator C7.2 HRSG, Duct Stack Foundations SUBTOTAL 6. C7 Combustion Turbline Generator C7.2 HRSG, Duct & Stack Foundations C7 | | | | | | 315 | | | | | 703 | | |
| SUBTOTAL 5, S33,591 \$18,834 \$1,168 \$53,593 \$4,287 \$5,433 \$63,314 158 | | | 1,132 | | 2,150 | | | \$3,283 | 263 | | | \$3,545 | 9 |
| COMBUSTION TURBINE/ACCESSORIES 1.1 Combustion Turbine Accessories 1.1 Combustion Turbine Accessories 1.2 Combustion Turbine Accessories 1.2 Combustion Turbine Accessories 1.2 Combustion Turbine Foundations SUBTOTAL 6. | 5.9 | | | | *** | | | 4===== | | | 4= 400 | **** | |
| 6.1 Combustion Turbine Generator N/A N/A N/A R.2 Compressed Air Piping Research Rese | | | | | \$18,834 | \$1,168 | | \$53,593 | \$4,287 | | \$5,433 | \$63,314 | 158 |
| 6.2 Combustion Turbine Accessories 6.3 Compressed Air Piping 6.9 Combustion Turbine Foundations SUBTOTAL 6. 7 HRSG, DUCTING & STACK 7.1 Hear Recovery Steam Generator 7.2 HRSG Accessories 7.3 Ductwood Stack Foundations 7.4 Stack 7.4 Stack 7.5 STEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 8.1 Steam TG & Accessories 8.1 Steam TG & Accessories 8.2 SubTOTAL 7. 8.1 Steam TG & Accessories 8.1 Steam TG & Accessories 8.2 Stack 8.3 Stack 8.4 Stack 8.4 Steam TG & Accessories 8.3 Stack 8.4 Steam TG & Accessories 8.5 Stack 8.6 Stack 8.6 Stack 8.7 Stack 8.7 Stack 8.8 Stack 8.9 Stack 8.8 Stack 8.9 Stack 8.9 Stack 8.9 Stack 8.0 | | | 1- | | N1/A | | | | | | | | |
| 6.9 Combustion Turbine Foundations SUBTOTAL 6. 7.1 Heat Recovery Steam Generator 7.2 HRSG ADUCTING & STACK 7.1 Heat Recovery Steam Generator 7.3 Ductwork 7.4 Stack 7.5 Ductwork 7.5 SUBTOTAL 7. 8 STEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 8.2 SUBTOTAL 7. 8.1 Steam TG & Accessories 8.2 SUBTOTAL 7. 8.2 STEAM TURBINE GENERATOR 8.3 Condenser & Auxiliaries 8.4 Steam Piping 9.6 S37 8.4 S16 8.4 Steam Piping 9.6 S37 8.5 STEAM SUBTOTAL 8. 9. COOLING WATER SYSTEM 9.1 Cooling Towers 9.2 Circulating Water Purpos 9.3 Circu Water Piping 9.4 Circ. Water Piping 9.5 Component Cooling Water System 9.3 Circ. Water System Auxiliaries 9.3 Circ. Water System Auxiliaries 9.3 Circ. Water System Auxiliaries 1.1 Steam TO Saccessories 1.1 Steam TG & Accessories 1.1 Steam TG & Accessories 1.2 Turbine Flant Auxiliaries 1.3 Steam TG & Accessories 1.4 Steam Piping 1.5 Steam TG & Accessories 1.5 S | | | | | | | | | | | | | |
| 6.9 Combustion Turbine Foundations SUBTOTAL 6. | | | N/A | | N/A | | | | | | | | |
| NA | | | | | | | | | | | | | |
| The HRSG, DUCTING & STACK The Recovery Steam Generator T.7 Har Recovery Steam Generator T.7 | 6.9 | | | | | | | | | | | | |
| 7.1 Heat Recovery Steam Generator 7.2 HRSG Accessories 7.3 Ductwork 4,459 3,499 245 \$8,202 656 1,772 \$10,630 26 7.4 \$10,027 26 7.5 \$10,027 26 26 27 27 27 27 27 | _ | | | | | | | | | | | | |
| 7.2 HRSG Accessories 7.3 Ductwork | 1 | | | | N1/A | | | | | | | | |
| 7.3 Ductwork | | | N/A | | N/A | | | | | | | | |
| 7.4 Stack 7.9 PRSG, Duct & Stack Foundations SUBTOTAL 7. Sp.491 \$280 355 25 \$659 53 214 \$926 2 2 2 2 2 2 2 2 2 | 1 | | | | | 0.45 | | | | | | | |
| 7.9 HRSG,Duct & Stack Foundations \$9,491 | | | | | | | | | | | | | |
| SUBTOTAL 7. \$9,491 \$280 \$7,038 \$493 \$17,302 \$1,384 \$2,897 \$21,583 54 8. STEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 33,394 5,502 385 \$39,281 3,143 4,242 \$46,666 116 8.2 Turbine Plant Auxiliaries 187 433 30 \$650 52 70 \$773 2 8.3 Condenser & Auxiliaries 4,816 1,332 93 \$6,241 499 674 \$7,415 18 8.4 Steam Piping 6,837 3,602 252 \$10,690 855 2,309 \$13,855 34 8.4 Steam Piping 6,837 3,611 1,126 79 \$1,565 125 507 \$2,198 5 9 COULING WATER SYSTEM \$45,234 \$361 \$11,995 \$840 \$58,429 \$4,674 \$7,803 \$79,906 176 9.1 Cooling Towers 6,199 1,375 96 \$7,671 614 828 \$9,113 23 9. | | | 5,032 | | -, | | | | | | | | |
| 8 STEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 33,394 5,502 385 \$39,281 3,143 4,242 \$46,666 116 8.2 Turbine Plant Auxiliaries 187 433 30 \$650 52 70 \$773 2 8.4 Steam Piping 6,837 3,602 252 \$10,690 855 2,309 \$13,855 34 8.9 TG Foundations SUBTOTAL 8. \$45,234 \$361 \$11,995 \$840 \$58,429 \$4,674 \$7,803 \$70,906 176 9 COOLING WATER SYSTEM \$45,234 \$361 \$11,995 \$840 \$58,429 \$4,674 \$7,803 \$70,906 176 9.1 Cooling Towers 6,199 1,375 96 \$7,671 614 828 \$9,113 23 9.2 Circulating Water Pumps 6,199 1,375 96 \$7,671 614 828 \$9,113 23 9.2 Circulating Water System Auxiliaries < | /.9 | | | | | | | | | | | | |
| 8.1 Steam TG & Accessories 33,394 5,502 385 \$39,281 3,143 4,242 \$46,666 116 8.2 Turbine Plant Auxiliaries 187 433 30 \$650 52 70 \$773 2 8.3 Condenser & Auxiliaries 4,816 1,332 93 \$6,241 499 674 \$7,415 18 8.4 Steam Piping 6,837 3,602 252 \$10,690 855 2,309 \$13,855 34 8.9 TG Foundations SUBTOTAL 8. \$45,234 \$361 \$11,955 \$840 \$58,429 \$4,674 \$7,603 \$70,906 176 9 COULING WATER SYSTEM \$45,234 \$361 \$11,955 \$840 \$58,429 \$4,674 \$7,803 \$70,906 176 9.1 Cooling Towers 6,199 1,375 96 \$7,671 614 828 \$9,113 23 9.2 Circulating Water Pumps 906 87 6 \$999 80 108 \$1,187 3 9.5 Make-up Water System Auxiliaries <td></td> <td></td> <td>\$9,491</td> <td>\$280</td> <td>\$7,038</td> <td>\$493</td> <td></td> <td>\$17,302</td> <td>\$1,384</td> <td></td> <td>\$2,897</td> <td>\$21,583</td> <td>54</td> | | | \$9,491 | \$280 | \$7,038 | \$493 | | \$17,302 | \$1,384 | | \$2,897 | \$21,583 | 54 |
| 8.2 Turbine Plant Auxiliaries 187 433 30 \$650 52 70 \$773 2 8.3 Condenser & Auxiliaries 4,816 1,332 93 \$6,241 499 674 \$7,415 18 8.4 Steam Piping 6,837 3,602 252 \$10,690 855 2,309 \$13,855 31,3855 31,3855 31,3855 31,3855 361 1,126 79 \$1,565 125 507 \$2,198 5 SUBTOTAL 8. \$45,234 \$361 \$11,995 \$840 \$58,429 \$4,674 \$7,803 \$70,906 176 COOLING WATER SYSTEM 9.1 Cooling Towers 6,199 1,375 96 \$7,671 614 828 \$9,113 23 9.2 Circ. Water System Auxiliaries 111 16 1 \$128 10 14 \$152 0 9.4 \$1,187 3 9.9 80 108 \$1,187 3 9.2 \$1,187 3 \$1,187 3 <td></td> <td></td> <td>00.004</td> <td></td> <td>F F00</td> <td>005</td> <td></td> <td>000.004</td> <td>0.440</td> <td></td> <td>4.040</td> <td>#40.000</td> <td>440</td> | | | 00.004 | | F F00 | 005 | | 000.004 | 0.440 | | 4.040 | # 40.000 | 440 |
| 8.3 Condenser & Auxiliaries 4,816 1,332 93 \$0,241 499 674 \$7,415 18 8.4 Steam Piping 6,837 3,602 252 \$10,690 855 2,309 \$13,855 34 8.9 TG Foundations SUBTOTAL 8. | | | | | | | | | | | | | |
| 8.4 Steam Piping 6,837 3,602 252 \$10,690 855 2,309 \$13,855 34 9 COOLING WATER SYSTEM \$45,234 \$361 \$1,195 \$840 \$58,429 \$4,674 \$7,803 \$70,906 176 9 COOLING WATER SYSTEM 9.1 Cooling Towers 6,199 1,375 96 \$7,671 614 828 \$9,113 23 9.2 Circulating Water Pumps 906 87 6 \$999 80 108 \$1,187 3 9.3 Circ. Water System Auxiliaries 1111 16 1 \$128 10 14 \$152 0 9.4 Circ. Water Piping 2,150 2,416 169 \$4,735 379 1,023 \$6,136 15 9.5 Make-up Water System 247 369 26 \$642 51 139 \$832 2 9.6 Component Cooling Water Sys 222 265 197 14 \$698 56 151 \$905 2 9.9 Circ. Water System Foundations 1,583 | | | | | | | | | | | | | |
| Substance | | | | | | | | | | | | | |
| SUBTOTAL 8 | | | 6,837 | | -, | | | , | | | | | |
| 9 COOLING WATER SYSTEM 9.1 Cooling Towers 6,199 1,375 96 87 6 \$999 80 108 \$1,187 3 9.2 Circulating Water Pumps 9.3 Circ.Water System Auxiliaries 111 16 1 1812 10 14 \$152 0 9.4 Circ.Water Piping 9.5 Make-up Water System 10.2 Cyclone Ash Letdown 10.3 HGCU Ash Letdown 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 10.7 Ash Transport & Feed Equipment 10.8 Misc. Ash Handling Equipment 10.9 Ash/Spent Sorbent Foundation 10.9 Cooling Water System 9.9 Circ.Water Piping 9.1 Cooling Towers 9.9 Circ.Water System Auxiliaries 9.9 Circ.Water System Auxiliaries 9.9 Circ.Water System Auxiliaries 9.9 Circ.Water System Substantial Signature 10.9 Ash/Spent Sorbent Foundations 1.5 Cooling Water System 1.1 Cooling Water System 1.2 Cyclone Ash Letdown 1.5 Cyclone Ash Letdown 1.6 Ash Storage Silos 1.7 Cyclone Ash Recovery Equipment 1.7 Cyclone Ash Recovery Equipment 1.8 Signature 1.9 Signature 1.0 Cyclone Ash Cyclone 1.0 Cyclone Ash Letdown 1.0 Cycl | 8.9 | | | | | | | . , | | | | . , | - 1 |
| 9.1 Cooling Towers 6,199 1,375 96 \$7,671 614 828 \$9,113 23 9.2 Circulating Water Pumps 906 87 6 \$999 80 108 \$1,187 3 9.3 Circ. Water System Auxiliaries 111 16 1 \$128 10 14 \$152 0 9.4 Circ. Water Piping 2,150 2,416 169 \$4,735 379 1,023 \$6,136 15 9.5 Make-up Water System 247 369 26 \$642 51 139 \$832 2 9.6 Component Cooling Water Sys 222 265 197 14 \$698 56 151 \$905 2 9.9 Circ. Water System Foundations \$1,583 2,805 196 \$4,584 367 1,485 \$6,436 16 10 ASH/SPENT SORBENT HANDLING SYS \$7,685 \$3,998 \$7,266 \$509 \$19,457 \$1,557 \$3,748 \$24,761 62 10.1 Ash Coolers N/A N/A | | | \$45,234 | \$361 | \$11,995 | \$840 | | \$58,429 | \$4,674 | | \$7,803 | \$70,906 | 176 |
| 9.2 Circulating Water Pumps 906 87 6 \$999 80 108 \$1,187 3 9.3 Circ. Water System Auxiliaries 111 16 1 \$128 10 14 \$152 0 9.4 Circ. Water Piping 2,150 2,416 169 \$4,735 379 1,023 \$6,136 15 9.5 Make-up Water System 247 369 26 \$642 51 139 \$832 2 9.6 Component Cooling Water Sys 222 265 197 14 \$698 56 151 \$905 2 9.9 Circ. Water System Foundations \$1,583 2,805 196 \$4,584 367 1,485 \$6,436 16 SUBTOTAL 9. \$7,685 \$3,998 \$7,266 \$509 \$19,457 \$1,557 \$3,748 \$24,761 62 10.1 Ash Coolers N/A | | | 0.400 | | 4.075 | 00 | | 07.074 | | | 000 | 00.440 | |
| 9.3 Circ.Water System Auxiliaries 111 16 1 \$128 10 14 \$152 0 9.4 Circ.Water Piping 2,150 2,416 169 \$4,735 379 1,023 \$6,136 15 9.5 Make-up Water System 247 369 26 \$642 51 139 \$832 2 9.6 Component Cooling Water Sys 222 265 197 14 \$698 56 151 \$905 2 9.9 Circ.Water System Foundations 1,583 2,805 196 \$4,584 367 1,485 \$6,436 16 SUBTOTAL 9. \$7,685 \$3,998 \$7,266 \$509 \$19,457 \$1,557 \$3,748 \$24,761 62 10. ASH/SPENT SORBENT HANDLING SYS N/A N/A N/A N/A N/A N/A N/A N/A \$1,557 \$3,748 \$24,761 62 10.1 ASH/SPENT SORBENT HANDLING SYS N/A N/A N/A N/A N/A N/A N/A N/A < | | | | | | | | | | | | | |
| 9.4 Circ.Water Piping | | | | | | | | | | | | | |
| 9.5 Make-up Water System 247 369 26 \$642 51 139 \$832 2 9.6 Component Cooling Water Sys 222 265 197 14 \$698 56 151 \$905 2 9.9 Circ.Water System Foundations SUBTOTAL 9. \$7,685 \$3,998 \$7,266 \$509 \$1,557 \$3,748 \$24,761 62 10 ASH/SPENT SORBENT HANDLING SYS N/A N/A N/A N/A N/A N/A \$1,557 \$3,748 \$24,761 62 10.1 Ash Coolers N/A | | | 111 | 0.450 | | - | | | | | | | |
| 9.6 Component Cooling Water Sys 9.9 Circ.Water System Foundations SUBTOTAL 9. 10 ASH/SPENT SORBENT HANDLING SYS 10.1 Ash Coolers 10.2 Cyclone Ash Letdown 10.3 HGCU Ash Letdown 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 10.7 Ash Transport & Feed Equipment 10.8 Misc. Ash Handling Equipment 10.9 Ash/Spent Sorbent Foundation 222 265 197 14 \$668 \$4,584 367 1,485 \$6,436 16 \$4,584 367 \$1,485 \$6,436 16 \$4,584 \$1,557 \$3,748 \$24,761 62 \$1,485 \$6,436 16 \$24,761 62 \$1,485 \$1,557 \$3,748 \$2,4761 62 | 1 | , 0 | | 2,150 | , | | | 1 ' ' | | | , | . , | |
| 9.9 Circ.Water System Foundations SUBTOTAL 9. 10 ASH/SPENT SORBENT HANDLING SYS 10.1 Ash Coolers N/A 10.2 Cyclone Ash Letdown 10.3 HGCU Ash Letdown 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 10.7 Ash Transport & Feed Equipment 10.8 Misc. Ash Handling Equipment 10.9 Ash/Spent Sorbent Foundation 10.9 Ash/Spent Sorbent Foundation 1,583 2,805 196 \$4,584 \$19,457 \$1,557 \$3,748 \$24,761 62 \$24,761 62 \$3,748 \$24,761 62 \$3,748 \$24,761 62 \$3,748 \$24,761 62 \$3,748 \$24,761 62 \$3,748 \$24,761 62 \$3,748 \$24,761 62 \$3,748 \$24,761 62 \$3,748 \$24,761 62 \$3,748 \$24,761 62 \$3,748 | | | | | | | | | | | | | |
| SUBTOTAL 9. \$7,685 \$3,998 \$7,266 \$509 \$19,457 \$1,557 \$3,748 \$24,761 62 | | | 222 | | | | | | | | | | |
| 10 ASH/SPENT SORBENT HANDLING SYS 10.1 Ash Coolers N/A N/A 10.2 Cyclone Ash Letdown N/A N/A 10.3 HGCU Ash Letdown N/A N/A 10.4 High Temperature Ash Piping N/A N/A 10.5 Other Ash Recovery Equipment N/A N/A 10.6 Ash Storage Silos 168 560 39 \$767 61 124 \$953 2 10.7 Ash Transport & Feed Equipment 5,691 10,053 704 \$16,448 1,316 2,665 \$20,429 51 10.9 Ash/Spent Sorbent Foundation 77 102 7 \$186 15 60 \$262 1 | 9.9 | | | | | | | | | | | | |
| 10.1 Ash Coolers | l | | | \$3,998 | \$7,266 | \$509 | | \$19,457 | \$1,557 | | \$3,748 | \$24,761 | 62 |
| 10.2 Cyclone Ash Letdown | | | | | | | | | | | | | |
| 10.3 HGCU Ash Letdown | | | | | | | | | | | | | |
| 10.4 High Temperature Ash Piping N/A | | | | | | | | | | | | | |
| 10.5 Other Ash Recovery Equipment N/A N/A 10.6 Ash Storage Silos 168 560 39 \$767 61 124 \$953 2 10.7 Ash Transport & Feed Equipment 10.8 Misc. Ash Handling Equipment 10.9 Ash/Spent Sorbent Foundation 77 102 7 \$186 15 60 \$262 1 | | | | | | | | | | | | | |
| 10.6 Ash Storage Silos | | | | | | | | | | | | | |
| 10.7 Ash Transport & Feed Equipment 5,691 10,053 704 \$16,448 1,316 2,665 \$20,429 51 10.8 Misc. Ash Handling Equipment 10.9 Ash/Spent Sorbent Foundation 77 102 7 \$186 15 60 \$262 1 | | | | | | | | | | | | | _ |
| 10.8 Misc. Ash Handling Equipment 10.9 Ash/Spent Sorbent Foundation 77 102 7 \$186 15 60 \$262 1 | | | | | | | | | | | | | |
| 10.9 Ash/Spent Sorbent Foundation 77 102 7 \$186 15 60 \$262 1 | | | 5,691 | | 10,053 | 704 | | \$16,448 | 1,316 | | 2,665 | \$20,429 | 51 |
| | | | | | | | | | | | | | |
| SUBTOTAL 10. \$5,859 \$77 \$10,715 \$750 \$17.402 \$1.392 \$2.849 \$21.643 54 | 10.9 | | 4 | | | | | | | | | | |
| | | SUBTOTAL 10. | \$5,859 | \$77 | \$10,715 | \$750 | | \$17,402 | \$1,392 | | \$2,849 | \$21,643 | 54 |

14-Aug-98

08:20 AM

Report Date:

DEPARTMENT OF ENERGY Market Based Advanced Coal Power Systems Client: Project: 14-Aug-98 Report Date: 08:20 AM

TOTAL PLANT COST SUMMARY

Case:

Supercritical PC 401.8 MW,net Plant Size: Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

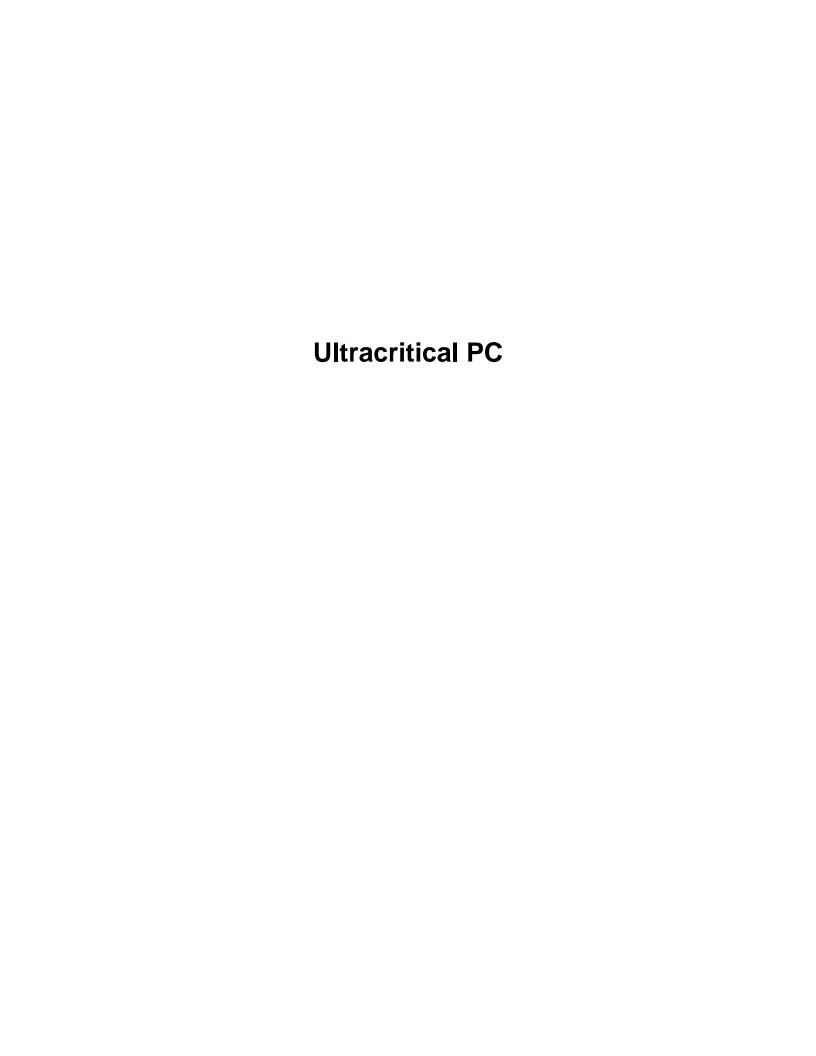
| | Plant Size: | 401.8 | ivivv ,net | EStir | nate Type: | Conce | ptuai | Co | st Base (Jan) | 1998 | (\$X1000) | |
|------|--------------------------------|-----------|------------|-----------|------------|-------|--------------|-----------|---------------|----------|-------------|-------|
| Acct | | Equipment | Material | Lal | oor | Sales | Bare Erected | Eng'g CM | Contingencies | | TOTAL PLANT | COST |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | | | | | | |
| 11.1 | Generator Equipment | 995 | | 158 | 11 | | \$1,164 | 93 | | 126 | \$1,383 | 3 |
| 11.2 | Station Service Equipment | 2,705 | | 870 | 61 | | \$3,636 | 291 | | 393 | \$4,319 | 11 |
| 11.3 | Switchgear & Motor Control | 2,156 | | 359 | 25 | | \$2,540 | 203 | | 412 | \$3,155 | 8 |
| 11.4 | Conduit & Cable Tray | | 1,300 | 4,080 | 286 | | \$5,666 | 453 | | 1,224 | \$7,343 | 18 |
| 11.5 | Wire & Cable | | 1,396 | 1,394 | 98 | | \$2,887 | 231 | | 624 | \$3,742 | 9 |
| 11.6 | Protective Equipment | 107 | | 355 | 25 | | \$486 | 39 | | 79 | \$603 | 2 |
| 11.7 | Standby Equipment | 657 | | 15 | 1 | | \$673 | 54 | | 109 | \$836 | 2 |
| 11.8 | Main Power Transformers | 2,555 | | 118 | 8 | | \$2,682 | 215 | | 434 | \$3,331 | 8 |
| 11.9 | Electrical Foundations | | 162 | 448 | 31 | | \$642 | 51 | | 208 | \$902 | 2 |
| | SUBTOTAL 11. | \$9,175 | \$2,859 | \$7,797 | \$546 | | \$20,376 | \$1,630 | | \$3,608 | \$25,614 | 64 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| 12.1 | PC Control Equipment | w/12.7 | | w/12.7 | | | | | | | | |
| 12.2 | Combustion Turbine Control | N/A | | N/A | | | | | | | | |
| 12.3 | Steam Turbine Control | w/8.1 | | w/8.1 | | | | | | | | |
| 12.4 | Other Major Component Control | | | | | | | | | | | |
| 12.5 | Signal Processing Equipment | W/12.7 | | w/12.7 | | | | | | | | |
| 12.6 | Control Boards, Panels & Racks | 116 | | 68 | 5 | | \$189 | 15 | | 41 | \$245 | 1 |
| 12.7 | Computer & Accessories | 3,702 | | 136 | 9 | | \$3,847 | 308 | | 415 | \$4,570 | 11 |
| 12.8 | Instrument Wiring & Tubing | 1,444 | | 4,487 | 314 | | \$6,245 | 500 | | 1,349 | \$8,094 | 20 |
| 12.9 | Other I & C Equipment | 852 | | 378 | 26 | | \$1,257 | 101 | | 136 | \$1,493 | 4 |
| | SUBTOTAL 12. | \$6,114 | | \$5,069 | \$355 | | \$11,538 | \$923 | | \$1,941 | \$14,401 | 36 |
| 13 | IMPROVEMENTS TO SITE | | | | | | | | | | | |
| 13.1 | Site Preparation | | 32 | 628 | 44 | | \$704 | 56 | | 228 | \$989 | 2 |
| 13.2 | Site Improvements | | 1,050 | 1,296 | 91 | | \$2,436 | 195 | | 789 | \$3,421 | 9 |
| 13.3 | Site Facilities | 1,882 | | 1,844 | 129 | | \$3,854 | 308 | | 1,249 | \$5,411 | 13 |
| | SUBTOTAL 13. | \$1,882 | \$1,082 | \$3,768 | \$264 | | \$6,995 | \$560 | | \$2,266 | \$9,821 | 24 |
| 14 | BUILDINGS & STRUCTURES | | | | | | | | | | | |
| 14.1 | Boiler Building | | 10,664 | 11,172 | 782 | | \$22,618 | 1,809 | | 6,107 | \$30,535 | 76 |
| 14.2 | Turbine Building | | 3,204 | 5,082 | 356 | | \$8,642 | 691 | | 2,333 | \$11,666 | 29 |
| 14.3 | Administration Building | | 324 | 408 | 29 | | \$761 | 61 | | 205 | \$1,027 | 3 |
| 14.4 | Circulation Water Pumphouse | | 23 | 22 | 2 | | \$47 | 4 | | 13 | \$63 | 0 |
| 14.5 | Water Treatment Buildings | | 226 | 221 | 15 | | \$462 | 37 | | 125 | \$624 | 2 |
| 14.6 | Machine Shop | | 289 | 231 | 16 | | \$536 | 43 | | 145 | \$724 | 2 |
| | Warehouse | | 196 | 234 | 16 | | \$446 | 36 | | 120 | \$602 | 1 |
| 14.8 | Other Buildings & Structures | | 120 | 122 | 9 | | \$250 | 20 | | 68 | \$338 | 1 |
| 14.9 | Waste Treating Building & Str. | | 230 | 831 | 58 | | \$1,119 | 89 | | 302 | \$1,510 | 4 |
| | SUBTOTAL 14. | | \$15,275 | \$18,323 | \$1,283 | | \$34,881 | \$2,790 | | \$9,418 | \$47,090 | 117 |
| | | | | | | | | | | | | |
| | TOTAL COST | \$214,705 | \$25,935 | \$130,160 | \$8,961 | | \$379,761 | \$30,381 | | \$61,347 | \$471,489 | 1173 |

| CONTINGENCY FACTO Supercritical PC | RS |
|--|---|
| Item/Description | Contingency Factors(%) %Process %Project |
| item/Description | 701 10Jest |
| COAL & SORBENT HANDLING | 20.0 |
| COAL & SORBENT PREP & FEED | 20.0 |
| FEEDWATER & MISC. BOP SYSTEMS | 23.5 |
| PC BOILER & ACCESSORIES | |
| PC Boiler | 10.0 |
| Open | |
| Open | |
| Boiler BoP (w/FD & ID Fans) | 10.0 |
| FLUE GAS CLEANUP | 9.4 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | |
| Combustion Turbine Accessories | |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | |
| HRSG Accessories, Ductwork and Stack | 15.5 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 10.0 |
| Turbine Plant Auxiliaries and Steam Piping | 17.2 |
| COOLING WATER SYSTEM | 17.8 |
| ASH/SPENT SORBENT HANDLING SYS | 15.2 |
| ACCESSORY ELECTRIC PLANT | 16.4 |
| INSTRUMENTATION & CONTROL | 15.6 |
| IMPROVEMENTS TO SITE | 30.0 |
| BUILDINGS & STRUCTURES | 25.0 |
| | |
| | |

| OPERATING LABOR RE | OPERATING LABOR REQUIREMENTS | | | | | | | | | | |
|--|------------------------------|--------------|--|--|--|--|--|--|--|--|--|
| Supercritical PC | | | | | | | | | | | |
| Operating Labor Rate(base): | 25.89 \$/hour | | | | | | | | | | |
| Operating Labor Burden: | 30.00 % of bas | se | | | | | | | | | |
| Labor O-H Charge Rate: | 25.00 % of lab | or | | | | | | | | | |
| Operating Labor Requirements(O.J.)per Shift: | | Total | | | | | | | | | |
| Category | 1 unit/mod. | <u>Plant</u> | | | | | | | | | |
| Skilled Operator | 2.0 | 2.0 | | | | | | | | | |
| Operator | 9.0 | 9.0 | | | | | | | | | |
| Foreman | 1.0 | 1.0 | | | | | | | | | |
| Lab Tech's, etc. | <u>2.0</u> | <u>2.0</u> | | | | | | | | | |
| TOTAL-O.J.'s | 14.0 | 14.0 | | | | | | | | | |

| CONSUMABLES, BY-PR | ODUCTS & FUELS DATA | | |
|---|---------------------|------------|--------|
| Supercritical PC | | | |
| | Consur | • | Unit |
| Item/Description | <u>Initial</u> | /Day | _Cost_ |
| Water(/1000 gallons) | | 5,022 | 0.80 |
| Chemicals* | | | |
| MU & WT Chem.(lbs)** | 364,670 | 12,156 | 0.16 |
| Limestone (ton)** | 10,822 | 360.7 | 16.25 |
| Formic Acid (lb) | 14,400 | 480.0 | 0.60 |
| Ammonia (NH3) ton | 1,548 | 51.6 | 32.00 |
| Other Supplemental Fuel(MBtu)** SCR Catalyst Replacement L.P. Steam(/1000 pounds) | | 10,782 | 1.00 |
| Waste Disposal Sludge(ton) Ash(ton) | | 535 352 | 10.00 |
| By-products & Emissions Total By-products | | | |
| Fuel(ton) | | 3,541 | 29.29 |

| MAINTENANCE FACTORS Supercritical PC | |
|--|-------------|
| Item/Description | Maintenance |
| COAL & SORBENT HANDLING | 2.1 |
| COAL & SORBENT PREP & FEED | 3.7 |
| FEEDWATER & MISC. BOP SYSTEMS | 2.3 |
| PC BOILER & ACCESSORIES | |
| PC Boiler | 3.5 |
| Open | |
| Open | |
| Boiler BoP (w/FD & ID Fans) | 4.5 |
| FLUE GAS CLEANUP | 3.4 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | |
| Combustion Turbine Accessories | |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | |
| HRSG Accessories, Ductwork and Stack | 1.0 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | |
| Turbine Plant Auxiliaries and Steam Piping | 4.1 |
| COOLING WATER SYSTEM | 1.2 |
| ASH/SPENT SORBENT HANDLING SYS | 3.0 |
| ACCESSORY ELECTRIC PLANT | 1.3 |
| INSTRUMENTATION & CONTROL | 1.6 |
| IMPROVEMENTS TO SITE | 0.6 |
| BUILDINGS & STRUCTURES | 1.4 |
| | |



| Title Description Case: Ditracritical PC 399.7 (MW net) HealRate: 8,251 (BlukWh) Primary/Secondary Fuel(type): 1010s #6 Cost: 1.26 (S/M/MBtu) Design/Construction: 1998 (Jan.) TPL Primary/Secondary Fuel(type): 1998 (Jan.) TPL Primary/Secondary Fuel Primary/Se | CAPITAL INVESTMENT & I | REVENUE REQUIREM | ENT SUMMAR | RY | |
|--|---|------------------|------------------|-------|------------|
| Case: Plant Size: Support (IMV, net) HealRate: Subt (StuWh) Primary/Secondary Fuel(type): Illinois #6 Cost: Cast: 1.26 (SM/MBtu) Primary/Secondary Fuel(type): Illinois #6 Cost: Cast: 20 (years) | | | | | |
| Plant Size: 3997 (NW, net) HeatRate: 8,251 (Bull/Wh) Design/Construction: 1.26 (\$MMBIND: Primary/Secondary Fuel(type): Illinois #6 Cost: 1.26 (\$MMBIND: Process Cost truction: 1.26 (\$MMBIND: Process Cost truction: 2005 (Jan.) Process Capital & Facilities 376,805 \$42.8 | | Ultracritical PC | | | |
| Design/Construction: 198 (Jan.) Booklife: 20 (years) 17PC/Plant Cost) Year: 198 (Jan.) 17P1 Vear: 2005 (Jan.) | | | HeatRate: | 8,251 | (Btu/kWh) |
| TPC[Plant Cost) Year: 1988 (Jan.) TPI Year: 2005 (Jan.) 25 (W) 25 (Jan.) 25 (W) 25 (Jan.) 25 (Ja | | Illnois #6 | Cost: | 1.26 | (\$/MMBtu) |
| CAPITAL INVESTMENT | | | | | |
| CAPITAL INVESTMENT \$x1000 \$k/kW Process Capital & Facilities 376,805 942.8 Engineering(incl C.M., H.O.& Fee) 30,144 75.4 Process Contingency 60,825 152.2 TOTAL Contingency \$467,774 1170.4 TOTAL CASH EXPENDED \$467,774 470.2 AFDC \$23,390 \$491,164 1229.0 Royalty Allowance 11,890 29.7 Preproduction Costs 11,890 29.7 Inventory Capital 4,054 10.1 Initial Catalyst & Chemicals (wequip.) 480 1.2 TOTAL CAPITAL REQUIREMENT (TCR) \$507,588 1270.0 OPERATING & MAINTENANCE COSTS (1998 Dollars) \$1000 \$/kW-yr Operating Labor 4,127 10.3 Maintenance Labor 2,120 5.3 Maintenance Material 3,180 8.0 Administrative & Support Labor 1,562 3.9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23,37 \$/kW-yr 0.06 ¢/kWh | | | TPI Year: | 2005 | (Jan.) |
| Process Capital & Facilities 376,805 942,8 Engineering(ind.C.M.,H.O.& Fee) 30,144 75.4 Process Contingency 60,825 152,2 TOTAL PLANT COST(TPC) \$467,774 1170,4 AFDC \$23,390 \$491,164 1229,0 Royally Allowance Preproduction Costs 11,890 29.7 Inventory Capital 1,890 1,045 10.1 Initial Catalyst & Chemicals (Wequip.) 1,480 1,24 Land Cost 4,054 1,054 10.1 Initial Catalyst & Chemicals (Wequip.) 1,416 1,229 Land Cost 4,127 1,33 Maintenance Labor 4,127 1,33 Maintenance Material 3,180 8,00 Maintenance Material 3,180 8,00 Administrative & Support Labor 1,562 3,9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23.37 \$kkW-yr VARIABLE O & M 23.37 \$kkW-yr VARIABLE O & M 23.37 \$kkW-yr CONSUMABLE OPERATING COSTS, less Fuel (1998 Dollars) 1,148 0,04 Water 1,148 0,04 Water 1,148 0,04 Water 1,047 0,04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0,16 BY-PRODUCT CREDITS (1998 Dollars) 530,819 1,04 PRODUCTION COST SUMMARY 6,04 0,06 Consumables 0,16 0,16 By-product Credit Fuel 0,94 1,42 TOTAL PRODUCTION COST 1,42 0,08 TOTAL PRODUCTION CO | Capacity Factor: | 85 (%) | | | |
| Project Contingency 60,825 152.2 TOTAL PLANT COST(TPC) TOTAL CASH EXPENDED AFDC TOTAL PLANT INVESTMENT(TPI) \$467,774 AFDC \$23,390 \$491,164 1170.4 Royalty Allowance Preproduction Costs Inventory Capital Initial Catalyst & Chemicals(w/equip.) Land Cost 11,890 223.7 Inventory Capital Initial Catalyst & Chemicals (w/equip.) Land Cost 480 1.2 TOTAL CAPITAL REQUIREMENT (TCR) \$507,588 1270.0 OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor Maintenance Labor 2,120 5.3 Maintenance Labor 2,120 5.3 Administrative & Support Labor 1,562 3.9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23,37 \$/kW-yr 23,37 \$/kW-yr VARIABLE O & M 23,37 \$/kW-yr 0.06 ¢/kWh CONSUMABLE OPERATING COSTS, less Fuel (1998 Dollars) \$x1000 ¢/kWh CONSUMABLE OPERATING COSTS, less Fuel (1998 Dollars) \$30,819 1.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 <td></td> <td></td> <td></td> <td></td> <td></td> | | | | | |
| TOTAL PLANT COST(TPC) | | | 30,144 | | 75.4 |
| TOTAL CASH EXPENDED | Project Contingency | | 60,825 | | 152.2 |
| TOTAL CASH EXPENDED | TOTAL PLANT COST(TPC) | | \$467.774 | | 1170.4 |
| AFDC TOTAL PLANT INVESTMENT (TPI) \$491,164 1229.0 Royalty Allowance Preproduction Costs 11,890 29.7 Inventory Capital 4,054 10.1 Initial Catalyst & Chemicals (w/equip.) 4,054 10.1 Land Cost 480 1.2 TOTAL CAPITAL REQUIREMENT (TCR) \$507,588 1270.0 OPERATING & MAINTENANCE COSTS (1998 Dollars) \$\$1000 \$\$/kW-yr | | \$467,77 | | | |
| Royalty Allowance | | | | | |
| Préproduction Costs Inventory Capital Inventory Capital Inventory Capital Intital Catalyst & Chemicals(w/equip.) Land Cost 11,890 4,054 10.1 10,1 1.1 Land Cost 480 1.2 TOTAL CAPITAL REQUIREMENT (TCR) \$507,588 1270.0 OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor 4,127 10.3 Maintenance Labor 2,120 5.3 Maintenance Material 3,180 8.0 Administrative & Support Labor \$10,989 27.5 FIXED O & M 23.37 \$/kW-yr \$kW-yr VARIABLE O & M 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh CONSUMABLE OPERATING COSTS, \$x4,735 0.06 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY \$x/kWh 23.4/kW-yr 0.31 2.4/kW-yr 0.31 FIXED O & M 0.06 0.06 0.06 0.06 0.06 BY-PRODUCT (1998 Dollars) \$30,819 1.04 1 | TOTAL PLANT INVESTMENT(TPI) | | \$491,164 | | 1229.0 |
| Inventory Capital 1,054 10.1 Initial Catalyst & Chemicals (Wequip.) 480 1.2 TOTAL CAPITAL REQUIREMENT (TCR) \$507,588 1270.0 OPERATING & MAINTENANCE COSTS (1998 Dollars) \$1000 \$1/kW-yr Operating Labor 4,127 10.3 Maintenance Labor 4,127 10.3 Maintenance Material 3,180 8.0 Administrative & Support Labor 1,562 3.9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23.37 \$1/kW-yr VARIABLE O & M 23.37 \$1/kW-yr VARIABLE O & M 23.37 \$1/kW-yr VARIABLE O CONSUMABLE OPERATING COSTS, less Fuel (1998 Dollars) \$1,148 0.04 Chemicals 2,540 0.09 Other Consumables 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 FUEL COST (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY \$1,142 \$1,047 \$1,047 \$1,047 \$1,047 Fixed O & M 0.06 \$1,047 \$ | | | | | |
| Initial Catalyst & Chemicals (w/equip.) 480 1.2 TOTAL CAPITAL REQUIREMENT (TCR) \$507,588 1270.0 OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor 4,127 10.3 Maintenance Labor 2,120 5.3 Maintenance Material 3,180 8.0 Administrative & Support Labor 1,562 3.9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23,37 \$/kW-yr \$x1000 ¢/kWh VARIABLE O & M 0.06 ¢/kWh 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY 1st Year (2005 \$) c/kWh 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0 | | | | | |
| Land Cost 480 1.2 TOTAL CAPITAL REQUIREMENT (TCR) \$507,588 1270.0 OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor 4,127 10.3 Maintenance Material 3,180 8.0 Administrative & Support Labor 1,562 3.9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23.37 \$/kW-yr VARIABLE O & M 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$1,148 0.04 Chemicals 2,540 0.09 Other Consumables 1,047 0.04 Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY 23.4/kW-yr 0.31 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 0.16 0.16 By-product Credit Fuel 0.94 0.94 0.89 TOTAL PRODUCTION COST 1.47 | | | 4,054 | | 10.1 |
| OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor 4,127 10.3 Maintenance Datorial 3,180 8.0 Maintenance Material 3,180 8.0 Administrative & Support Labor 1,562 3.9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23.37 \$/kW-yr VARIABLE O & M \$10,989 27.5 CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$1000 e/kWh Water 1,148 0.04 Chemicals 2,540 0.09 Other Consumables 1,047 0.04 Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY e/kWh 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 20.34/kW-yr 0.31 20.34/kWh 20.34/kWh 20.34/kWh | | | 480 | | 1.2 |
| OPERATING & MAINTENANCE COSTS (1998 Dollars) \$x1000 \$/kW-yr Operating Labor 4,127 10.3 Maintenance Datorial 3,180 8.0 Maintenance Material 3,180 8.0 Administrative & Support Labor 1,562 3.9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23.37 \$/kW-yr VARIABLE O & M \$10,989 27.5 CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$1000 e/kWh Water 1,148 0.04 Chemicals 2,540 0.09 Other Consumables 1,047 0.04 Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY e/kWh 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 23.4/kW-yr 0.31 20.34/kW-yr 0.31 20.34/kWh 20.34/kWh 20.34/kWh | TOTAL CARITAL REQUIREMENT/TOR | | A 507.500 | | 4070.0 |
| Operating Labor 4,127 10.3 Maintenance Labor 2,120 5.3 Maintenance Material 3,180 8.0 Maintenance Material 3,180 8.0 Maintenance Material 3,180 8.0 Maintenance Material 3,180 8.0 Maintenance Material 3.9 Maintenance Material 3.0 Ma | TOTAL CAPITAL REQUIREMENT(TCR |) | \$507,588 | | 1270.0 |
| Operating Labor 4,127 10.3 Maintenance Labor 2,120 5.3 Maintenance Material 3,180 8.0 Maintenance Material 3,180 8.0 Maintenance Material 3,180 8.0 Maintenance Material 3,180 8.0 Maintenance Material 3.9 Maintenance Material 3.0 Ma | OPERATING & MAINTENANCE COSTS (1998 D | ollars) | \$x1000 | | \$/kW-vr |
| Maintenance Material Administrative & Support Labor 3,180 1,562 8.0 3.9 TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23.37 \$/kW-yr VARIABLE O & M 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Water 1,148 0.04 Chemicals 2,540 0.09 Other Consumables 1,047 0.04 Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 FUEL COST (1998 Dollars) \$30,819 2.04 PRODUCTION COST SUMMARY \$2,4/kW-yr 0.31 2.34/kW-yr 0.31 Prixed O & M 0.06 Consumables 0.06 0.06 0.06 By-product Credit Fuel TOTAL PRODUCTION COST 1.47 1.42 0.94 0.89 0.89 0.89 0.89 0.89 0.89 0.89 0.89 | | - | | | |
| Administrative & Support Labor TOTAL OPERATION & MAINTENANCE FIXED O & M VARIABLE O & M CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) Water Chemicals Other Consumables Waste Disposal TOTAL CONSUMABLE OPERATING COSTS Waste Disposal TOTAL CONSUMABLE OPERATING COSTS **4,735** **1,047** **0.04** TOTAL CONSUMABLE OPERATING COSTS **4,735** **0.16** BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) **50,040** **PRODUCT (1998 Dollars) **50,040** **PRODUCTION COST SUMMARY Fixed O & M Variable O & M Consumables By-product Credit Fuel TOTAL PRODUCTION COST **15,562** **10,989** **1,1562** **2,337** **KWh 1,148** 0.04 2,540 0.09 1,047 0.16** **Evelized (10th.Year \$) **E/kWh 23.4/kW-yr 0.31 23. | Maintenance Labor | | 2,120 | | 5.3 |
| TOTAL OPERATION & MAINTENANCE \$10,989 27.5 FIXED O & M 23.37 \$/kW-yr VARIABLE O & M 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Water 1,148 0.04 Chemicals 2,540 0.09 Other Consumables Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY Fixed O & M 23.4/kW-yr 0.31 Variable O & M 0.06 Consumables By-product Credit Fuel TOTAL PRODUCTION COST 1.47 0.99 TOTAL PRODUCTION COST 1.47 1.42 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | | | | | |
| FIXED O & M VARIABLE O & M CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) Water | Administrative & Support Labor | | 1,562 | | 3.9 |
| VARIABLE O & M 0.06 ¢/kWh CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars) \$x1000 ¢/kWh Water 1,148 0.04 Chemicals 2,540 0.09 Other Consumables 1,047 0.04 Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY 23.4/kW-yr 0.31 ¢/kWh Fixed O & M 0.06 0.06 0.06 Consumables 0.16 0.16 0.16 By-product Credit 0.94 0.89 0.89 TOTAL PRODUCTION COST 1.47 1.42 1.42 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | TOTAL OPERATION & MAINTENANCE | : | \$10,989 | | 27.5 |
| CONSUMABLE OPERATING COSTS, less Fuel (1998 Dollars) \$x1000 ¢/kWh Water 1,148 0.04 Chemicals 2,540 0.09 Other Consumables 1,047 0.04 Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY \$30,819 1.04 FIXED COST SUMMARY | FIXED O & M | | | 23.37 | \$/kW-yr |
| Water Chemicals 1,148 0.04 Chemicals 2,540 0.09 Other Consumables 1,047 0.04 Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY \$1st Year (2005 \$) Levelized (10th. Year \$) Fixed O & M 0.06 0.06 0.06 Consumables 0.16 0.16 0.16 By-product Credit 0.94 0.89 0.89 TOTAL PRODUCTION COST 1.47 1.42 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | VARIABLE O & M | | | 0.06 | ¢/kWh |
| Chemicals Other Consumables Waste Disposal 2,540 0.09 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY Fixed O & M 1st Year (2005 \$) c/kWh Levelized (10th.Year \$) c/kWh 23.4/kW-yr 0.31 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 0.06 Consumables By-product Credit Fuel 0.94 0.89 0.89 TOTAL PRODUCTION COST 1.47 1.42 171.5/kW-yr 2.30 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars) | \$x1000 | | ¢/kWh |
| Other Consumables Waste Disposal 1,047 0.04 TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY \$30,819 1.04 Fixed O & M \$2,4/kW-yr 0.31 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 0.06 0.06 Consumables 0.16 0.16 0.16 0.16 By-product Credit 0.94 0.89 0.89 TOTAL PRODUCTION COST 1.47 1.42 171.5/kW-yr 2.30 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 171.5/kW-yr 2.30 | | | | | |
| TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 | | | 2,540 | | 0.09 |
| TOTAL CONSUMABLE OPERATING COSTS \$4,735 0.16 BY-PRODUCT CREDITS (1998 Dollars) FUEL COST (1998 Dollars) \$30,819 1.04 PRODUCTION COST SUMMARY Fixed O & M Variable O & M Consumables By-product Credit Fuel TOTAL PRODUCTION COST TOTAL PRODUCTI | | | 1.047 | | 0.04 |
| ## PRODUCT CREDITS (1998 Dollars) ### PRODUCTION COST (1998 Dollars) ### PRODUCTION COST SUMMARY Fixed O & M | · | OSTS | | | 0.16 |
| Total Production Cost Summary Su | | 0010 | ψ4,700 | | 0.10 |
| Section Sect | | | | | |
| PRODUCTION COST SUMMARY ¢/kWh ¢/kWh Fixed O & M 23.4/kW-yr 0.31 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 0.06 Consumables 0.16 0.16 0.16 By-product Credit 0.94 0.89 0.89 TOTAL PRODUCTION COST 1.47 1.42 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | FUEL COST (1998 Dollars) | | \$30,819 | | 1.04 |
| Fixed O & M 23.4/kW-yr 0.31 23.4/kW-yr 0.31 Variable O & M 0.06 0.06 0.06 Consumables 0.16 0.16 0.16 By-product Credit 0.94 0.89 0.89 TOTAL PRODUCTION COST 1.47 1.42 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | PRODUCTION COST SUMMARY | | | | ear \$) |
| Variable O & M 0.06 0.06 Consumables 0.16 0.16 By-product Credit 0.94 0.89 TOTAL PRODUCTION COST 1.47 1.42 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | | | | | |
| Consumables 0.16 By-product Credit 0.94 Fuel 0.94 TOTAL PRODUCTION COST 1.47 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | | · | - | | |
| Fuel 0.94 0.89 TOTAL PRODUCTION COST 1.47 1.42 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | | | | | |
| TOTAL PRODUCTION COST 1.47 1.42 LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | By-product Credit | | | | |
| LEVELIZED CARRYING CHARGES(Capital) 171.5/kW-yr 2.30 | | | | | |
| | | 1.4 | | | |
| LEVELIZED (10th.Year) BUSBAR COST OF POWER 3.72 | LEVELIZED CARRYING CHARGES(Capital) | | 171.5/kW-yr | 2.30 | |
| | LEVELIZED (10th.Year) BUSBAR COST OF PO | WER | | 3.72 | |

| ESTIMATE BASIS/FINANCIAL CRIT | ERIA for REVEN | UE REQUIR | REMENT CAL | CULATION | IS |
|---|---|------------------|---|-----------------|---|
| GENERAL DATA/CHARACTERISTICS | | | | | |
| Case Title: | ı | Ultracritical I | PC | | |
| Unit Size:/Plant Size: | | 399.7 | MW,net | 399.7 | MWe |
| Location: | ĺ | Middletown, | USA | | |
| Fuel: Primary/Secondary | I | Illnois #6 | | | |
| Energy From Primary/Secondary Fuels | | 8,251 | Btu/kWh | | Btu/kWh |
| Levelized Capacity Factor / Preproduction(equiv | alent months): | 85 | % | 1 | months |
| Capital Cost Year Dollars (Reference Year Dollar | ars): | 1998 | (January) | | |
| Delivered Cost of Primary/Secondary Fuel | | 1.26 | \$/MBtu | | \$/MBtu |
| Design/Construction Period: | | 3 | years | | |
| Plant Startup Date (1st. Year Dollars): | | 2005 | (January) | | |
| Land Area/Unit Cost | | 320 | acre | \$1,500 | /acre |
| FINANCIAL CRITERIA | | | | | |
| Project Book Life: | | 20 | years | | |
| Book Salvage Value: | | | % | | |
| Project Tax Life: | | 20 | years | | |
| Tax Depreciation Method: | | Accel. based | d on ACRS CI | ass | |
| Property Tax Rate: | | 1.0 | % per year | | |
| Insurance Tax Rate: | | 1.0 | % per year | | |
| Federal Income Tax Rate: | | 34.0 | % | | |
| State Income Tax Rate: | | 6.0 | % | | |
| Investment Tax Credit/% Eligible | | | % | | % |
| Economic Basis: | | 10th.Year | Constant Doll | lars | |
| Capital Structure Common Equity Preferred Stock | - | % of Total 20 | _ | Cost(%) 16.5 | |
| Debt Weighted Cost of Capital:(after tax) | | 80 | 6.2 % | 5.8 % | |
| Escalation Rates | General Primary Fuel Secondary Fuel | | ife 1 % per year % per year % per year | | 5 % per year % per year % per year |

 Client:
 DEPARTMENT OF ENERGY
 Report Date:
 14-Aug-98

 Project:
 Market Based Advanced Coal Power Systems
 08:24 AM

TOTAL PLANT COST SUMMARY

Case: Ultracritical PC

Plant Size: 399.7 MW,net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| | | , , , | | | | | | | | | | |
|-------------|---|-----------------------------------|------------------|--------------------------|--------------------------|--------------|---|---------------------------------|--------------------|--------------------------------|-------------|-------------------------|
| Acct No. | Item/Description | Equipment Cost | Material Cost | Lat Direct | oor Indirect | Sales Tax | Bare Erected Cost \$ | Eng'g CM H.O.& Fee | Conting Process | encies Project | TOTAL PLANT | \$/kW |
| NO. | item/Description | Cost | Cost | Direct | mairect | Iax | COSt \$ | п.О.а гее | Frocess | Project | • | ⇒/KVV |
| 1 | COAL & SORBENT HANDLING | 6,617 | 1,951 | 5,042 | 353 | | \$13,962 | 1,117 | | 3,016 | \$18,095 | 45 |
| 2 | COAL & SORBENT PREP & FEED | 8,283 | | 2,590 | 181 | | \$11,054 | 884 | | 2,388 | \$14,326 | 36 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 16,924 | | 7,397 | 518 | | \$24,839 | 1,987 | | 6,232 | \$33,059 | 83 |
| 4.2 | PC BOILER & ACCESSORIES PC Boiler Open Open | 58,543 | | 23,892 | 1,672 | | \$84,107 | 6,729 | | 9,084 | \$99,919 | 250 |
| | Boiler BoP (w/FD & ID Fans) SUBTOTAL 4 | 3,076 61,618 | | 1,014 24,906 | 71 1,743 | | \$4,160 <i>\$88,267</i> | 333 7,061 | | 449 9,533 | | 12 262 |
| 5 | FLUE GAS CLEANUP | 32,690 | | 18,332 | 1,137 | | \$52,159 | 4,173 | | 5,289 | \$61,621 | 154 |
| | COMBUSTION TURBINE/ACCESSORIE Combustion Turbine Generator Combustion Turbine Accessories SUBTOTAL 6 | N/A | | N/A | | | | | | | | |
| | HRSG, DUCTING & STACK Heat Recovery Steam Generator HRSG Accessories, Ductwork and Stack SUBTOTAL 7 | N/A 9,202 9,202 | 271 271 | N/A 6,824 6,824 | 478 <i>478</i> | | \$16,774 <i>\$16,774</i> | 1,342 <i>1,342</i> | | 2,809 2,809 | | 52 52 |
| | STEAM TURBINE GENERATOR Steam TG & Accessories Turbine Plant Auxiliaries and Steam Piping SUBTOTAL 8 | 34,999 11,797 <i>46,796</i> | 359 359 | 5,766 6,470 12,236 | 404 453 857 | | \$41,169 \$19,079 <i>\$60,248</i> | 3,294 1,526 <i>4</i> ,820 | | 4,446 3,548 <i>7,994</i> | | 122 60 <i>183</i> |
| 9 | COOLING WATER SYSTEM | 7,658 | 3,984 | 7,241 | 507 | | \$19,390 | 1,551 | | 3,735 | \$24,676 | 62 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | 5,721 | 76 | 10,462 | 732 | | \$16,991 | 1,359 | | 2,782 | \$21,132 | 53 |
| 11 | ACCESSORY ELECTRIC PLANT | 9,164 | 2,859 | 7,797 | 546 | | \$20,365 | 1,629 | | 3,606 | \$25,600 | 64 |
| 12 | INSTRUMENTATION & CONTROL | 6,138 | | 5,089 | 356 | | \$11,584 | 927 | | 1,949 | \$14,459 | 36 |
| 13 | IMPROVEMENTS TO SITE | 1,877 | 1,079 | 3,759 | 263 | | \$6,978 | 558 | | 2,261 | \$9,798 | 25 |
| 14 | BUILDINGS & STRUCTURES | | 14,976 | 17,960 | 1,257 | | \$34,193 | 2,735 | | 9,232 | \$46,161 | 115 |
| | TOTAL COST | \$212,688 | \$25,555 | \$129,634 | \$8,928 | | \$376,805 | \$30,144 | | \$60,825 | \$467,774 | 1170 |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98 08:24 AM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Case: Ultracritical PC

Plant Size: 399.7 MW,net Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| Acct | | Equipment | Material | Lab | or | Salac | Bare Erected | Engia CM | Contingencies | | TOTAL PLANT | COST |
|------|--------------------------------|----------------|----------|-----------------|----------|-------|--------------|-------------|---------------|---------|-------------|-------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | 0031 | 0031 | Direct | mancot | IUA | - σοσι ψ | 11.0.4 1 00 | 1100033 | Troject | | Ψ/ΚΨ |
| 1 ' | Coal Receive & Unload | 1.618 | | 890 | 62 | | \$2.570 | 206 | | 555 | \$3,331 | 8 |
| | Coal Stackout & Reclaim | 2,091 | | 571 | 40 | | \$2,702 | 216 | | 584 | \$3,501 | 9 |
| | Coal Conveyors & Yd Crush | 1.944 | | 565 | 40 | | \$2,548 | 204 | | 550 | \$3,302 | 8 |
| | Other Coal Handling | 509 | | 131 | 9 | | \$648 | 52 | | 140 | \$840 | 2 |
| | Sorbent Receive & Unload | 67 | | 24 | 2 | | \$94 | 7 | | 20 | \$121 | 0 |
| 1 | Sorbent Stackout & Reclaim | | | | - | | Ψο-1 | ' | | 20 | ψ121 | Ū |
| | Sorbent Conveyors | 388 | | 115 | 8 | | \$511 | 41 | | 110 | \$662 | 2 |
| | Other Sorbent Handling | 300 | | 113 | O | | Ψ511 | 7' | | 110 | ψ002 | 2 |
| | Coal & Sorbent Hnd.Foundations | | 1,951 | 2.746 | 192 | | \$4,889 | 391 | | 1,056 | \$6,336 | 16 |
| ' | SUBTOTAL 1. | \$6,617 | \$1,951 | \$5,042 | \$353 | | \$13,962 | \$1,117 | | \$3,016 | \$18,095 | 45 |
| 2 | COAL & SORBENT PREP & FEED | 40,011 | Ψ1,001 | ψ0,04 2 | φοσο | | Ψ10,002 | Ψ., | | ψο,στο | ψ10,000 | |
| | Coal Crushing & Drying | 913 | | 214 | 15 | | \$1.142 | 91 | | 247 | \$1,480 | 4 |
| | Coal Conveyor / Storage | 5,404 | | 1,421 | 99 | | \$6,925 | 554 | | 1.496 | \$8,975 | 22 |
| | Coal Injection System | 3,404 | | 1,421 | 33 | | ψ0,323 | 334 | | 1,430 | Ψ0,973 | 22 |
| | Misc.Coal Prep & Feed | | | | | | | | | | | |
| | Sorbent Prep Equipment | 1.816 | | 454 | 32 | | \$2,302 | 184 | | 497 | \$2,983 | 7 |
| | Sorbent Storage & Feed | 150 | | 499 | 35 | | \$685 | 55 | | 148 | \$887 | 2 |
| | Sorbent Injection System | 130 | | 400 | 55 | | ψ000 | 55 | | 140 | φοσι | 2 |
| | Booster Air Supply System | | | | | | | | | | | |
| | Coal & Sorbent Feed Foundation | | | | | | | | | | | |
| 2.0 | SUBTOTAL 2. | \$8,283 | | \$2,590 | \$181 | | \$11.054 | \$884 | | \$2,388 | \$14,326 | 36 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 40,200 | | Ψ2,000 | ψ.σ. | | ψ11,004 | 4004 | | Ψ2,000 | ψ1-1,020 | |
| | FeedwaterSystem | 5,145 | | 1,635 | 114 | | \$6.894 | 552 | | 1,489 | \$8,935 | 22 |
| | Water Makeup & Pretreating | 2,047 | | 724 | 51 | | \$2,821 | 226 | | 914 | \$3,961 | 10 |
| | Other Feedwater Subsystems | 3.957 | | 1.407 | 98 | | \$5,462 | 437 | | 1.180 | \$7.079 | 18 |
| | Service Water Systems | 393 | | 240 | 17 | | \$650 | 52 | | 211 | \$912 | 2 |
| | Other Boiler Plant Systems | 2.185 | | 1.806 | 126 | | \$4.117 | 329 | | 889 | \$5,336 | 13 |
| | FO Supply Sys & Nat Gas | 133 | | 193 | 14 | | \$340 | 27 | | 73 | \$441 | 1 |
| | Waste Treatment Equipment | 1.483 | | 869 | 61 | | \$2.413 | 193 | | 782 | \$3,388 | 8 |
| | Misc. Power Plant Equipment | 1,581 | | 525 | 37 | | \$2,142 | 171 | | 694 | \$3,008 | 8 |
| 0.0 | SUBTOTAL 3. | \$16,924 | | \$7,397 | \$518 | | \$24,839 | \$1,987 | | \$6,232 | \$33,059 | 83 |
| 4 | PC BOILER & ACCESSORIES | ψ10,024 | | ψι,σσι | ψ0.0 | | ΨΞ-1,000 | ψ1,557 | | Ψ0,202 | ψου,σου | |
| | PC Boiler | 58,543 | | 23,892 | 1,672 | | \$84,107 | 6,729 | | 9,084 | \$99,919 | 250 |
| | ! Open | 00,010 | | 20,002 | 1,072 | | ΨΟΊ,ΤΟΊ | 0,720 | | 0,001 | φοσ,στο | 200 |
| 1 | Open | | | | | | | | | | | |
| | Boiler BoP (w/FD & ID Fans) | 3.076 | | 1.014 | 71 | | \$4.160 | 333 | | 449 | \$4,942 | 12 |
| | Primary Air System | w/4.1 | , | w/4.1 | | | ψ1,100 | | | 143 | ψ-1,5-72 | 12 |
| | Secondary Air System | w/4.1 w/4.1 | | w/4.1 | | | | | | | | |
| | Major Component Rigging | 1 ' | | w/4.1 w/4.1 | | | | | | | | |
| | PC Foundations | 1 | | w/4.1 w/14.1 | | | | | | | | |
| 7.3 | SUBTOTAL 4. | | *** 17.1 | \$24,906 | \$1,743 | | \$88,267 | \$7,061 | | \$9,533 | \$104,861 | 262 |
| | GODIOTAL 4. | ψο1,010 | | Ψ24,500 | Ψ1,143 | | ψ00,201 | ψ1,001 | | ψ5,555 | Ψ10-7,001 | |

Client: DEPARTMENT OF ENERGY Project:

Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Ultracritical PC Case:

Plant Size: 399.7 MW,net Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| | Fidit Size. | 000.1 | ivivv ,i iet | | iate i ype. | 001100 | ptuui | 00 | st base (Jan) | 1990 | (ΦΧ1000) | |
|------|---|----------------|-------------------|-----------------|-------------|--------|--------------------------|---------------------|---------------|-------------------------|-------------------|-------|
| Acct | | Equipment | Material | Lab | or | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | | Project | \$ | \$/kW |
| | | | | | | | | | | | | |
| 5 | FLUE GAS CLEANUP | | | | | | | | | | | |
| | Absorber Vessels & Accessories | 15,813 | | 2,148 | 150 | | \$18,112 | 1,449 | | 1,956 | \$21,517 | 54 |
| | ? Other FGD | 1,152 | | 1,052 | 74 | | \$2,277 | 182 | | 246 | \$2,705 | 7 |
| | Bag House & Accessories | 9,908 | | 3,401 | 238 | | \$13,547 | 1,084 | | 1,463 | \$16,094 | 40 |
| | Other Particulate Removal Materials | 3,061 | | 5,242 | 367 | | \$8,669 | 694 | | 936 | \$10,299 | 26 |
| | Gypsum Dewatering System | 1,656 | | 4,403 | 308 | | \$6,368 | 509 | | 688 | \$7,565 | 19 |
| | Mercury Removal System | 1,099 | | 2,086 | | | \$3,185 | 255 | | | \$3,440 | 9 |
| 5.9 | Open Open | | | | | | | | | | | |
| | SUBTOTAL 5. | \$32,690 | | \$18,332 | \$1,137 | | \$52,159 | \$4,173 | | \$5,289 | \$61,621 | 154 |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | | | | | | | | | | |
| | Combustion Turbine Generator | N/A | | N/A | | | | | | | | |
| | Combustion Turbine Accessories | N/A | | N/A | | | | | | | | |
| | Compressed Air Piping | | | | | | | | | | | |
| 6.9 | Combustion Turbine Foundations | | | | | | | | | | | |
| _ | SUBTOTAL 6. | | | | | | | | | | | |
| 7 | HRSG, DUCTING & STACK | | | | | | | | | | | |
| | Heat Recovery Steam Generator | N/A | | N/A | | | | | | | | |
| | PHRSG Accessories | | | | | | | | | | | |
| | Ductwork | 4,323 | | 3,392 | 237 | | \$7,952 | 636 | | 1,718 | \$10,306 | 26 |
| | Stack | 4,879 | | 3,088 | 216 | | \$8,183 | 655 | | 884 | \$9,721 | 24 |
| 7.9 | HRSG,Duct & Stack Foundations | | 271 | 344 | 24 | | \$639 | 51 | | 207 | \$898 | 2 |
| _ | SUBTOTAL 7. | \$9,202 | \$271 | \$6,824 | \$478 | | \$16,774 | \$1,342 | | \$2,809 | \$20,925 | 52 |
| 8 | STEAM TURBINE GENERATOR | | | | | | * 44.400 | | | | | 400 |
| | Steam TG & Accessories | 34,999 | | 5,766 | 404 | | \$41,169 | 3,294 | | 4,446 | \$48,909 | 122 |
| | 2 Turbine Plant Auxiliaries | 186 | | 431 | 30 | | \$648 | 52 | | 70 | \$770 | 2 |
| | Condenser & Auxiliaries | 4,798 | | 1,328 | 93 | | \$6,219 | 498 | | 672 | \$7,388 | 18 |
| | Steam Piping | 6,812 | 0=0 | 3,589 | 251 | | \$10,652 | 852 | | 2,301 | \$13,805 | 35 |
| 8.9 | TG Foundations | *40 700 | 359 | 1,122 | 79 | | \$1,560 | 125 | | 505 | \$2,190 | 5 |
| _ | SUBTOTAL 8. | \$46,796 | \$359 | \$12,236 | \$857 | | \$60,248 | \$4,820 | | \$7,994 | \$73,062 | 183 |
| 9 | COOLING WATER SYSTEM | 0.470 | | 4.074 | 00 | | 67.045 | 040 | | 000 | #0.000 | 00 |
| | Cooling Towers | 6,178 | | 1,371 | 96 | | \$7,645 | 612 | | 826 | \$9,082 | 23 |
| | ? Circulating Water Pumps | 903 | | 87 | 6 | | \$996 | 80 | | 108 | \$1,183 | 3 |
| | Circ.Water System Auxiliaries | 110 | 0.440 | 16 | 1 | | \$127 | 10 | | 14 | \$151 | 0 |
| | Circ.Water Piping | 0.40 | 2,142 | 2,408 | 169 | | \$4,718 | 377 | | 1,019 | \$6,115 | 15 |
| | Make-up Water System | 246 | 005 | 368 | 26 | | \$640 | 51 | | 138 | \$829 | 2 |
| | Component Cooling Water Sys | 221 | 265 | 196 | 14 | | \$696 | 56 | | 150 | \$902 | 2 |
| 9.9 | Circ.Water System Foundations | ₹7.050 | 1,577 | 2,795 | 196 | | \$4,568 | 365 | | 1,480 | \$6,414 | 16 |
| 40 | SUBTOTAL 9. | \$7,658 | \$3,984 | \$7,241 | \$507 | | \$19,390 | \$1,551 | | \$3,735 | \$24,676 | 62 |
| 10 | ASH/SPENT SORBENT HANDLING SYS Ash Coolers | N/A | | N/A | | | | | | | | |
| | 2 Cyclone Ash Letdown | N/A | | N/A N/A | | | | | | | | |
| | • | N/A | | N/A N/A | | | | | | | | |
| | B HGCU Ash Letdown | N/A | | N/A N/A | | | | | | | | |
| | High Temperature Ash Piping | N/A | | N/A N/A | | | | | | | | |
| | Other Ash Recovery Equipment | 164 | | N/A 547 | 38 | | \$749 | 60 | | 121 | \$930 | 2 |
| | 6 Ash Storage Silos 7 Ash Transport & Feed Equipment | 5,557 | | 9,816 | 687 | | \$749 \$16,060 | 1,285 | | 2,602 | \$19,946 | 50 |
| | B Misc. Ash Handling Equipment | 5,557 | | 9,016 | 087 | | \$10,060 | 1,265 | | 2,002 | \$19,946 | 50 |
| | Ash/Spent Sorbent Foundation | | 76 | 99 | 7 | | \$182 | 15 | | 59 | \$255 | 1 |
| 10.8 | SUBTOTAL 10. | \$5,721 | 76 \$76 | \$10,462 | \$732 | | \$182 \$16,991 | \$1,359 | | \$2, 782 | \$255 \$21.132 | 53 |
| | SUBTUTAL IU. | Ψ 0,121 | Ψ/0 | \$10,40Z | φι 3Z | | \$10,391 | ₁ φ1,339 | | Ψ Ζ,1 0 Ζ | ⊅∠1,13∠ | 33 |

14-Aug-98

08:24 AM

DEPARTMENT OF ENERGY Market Based Advanced Coal Power Systems Client: Project: Report Date: 14-Aug-98 08:24 AM

TOTAL PLANT COST SUMMARY

Case:

Ultracritical PC 399.7 MW,net Plant Size: Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

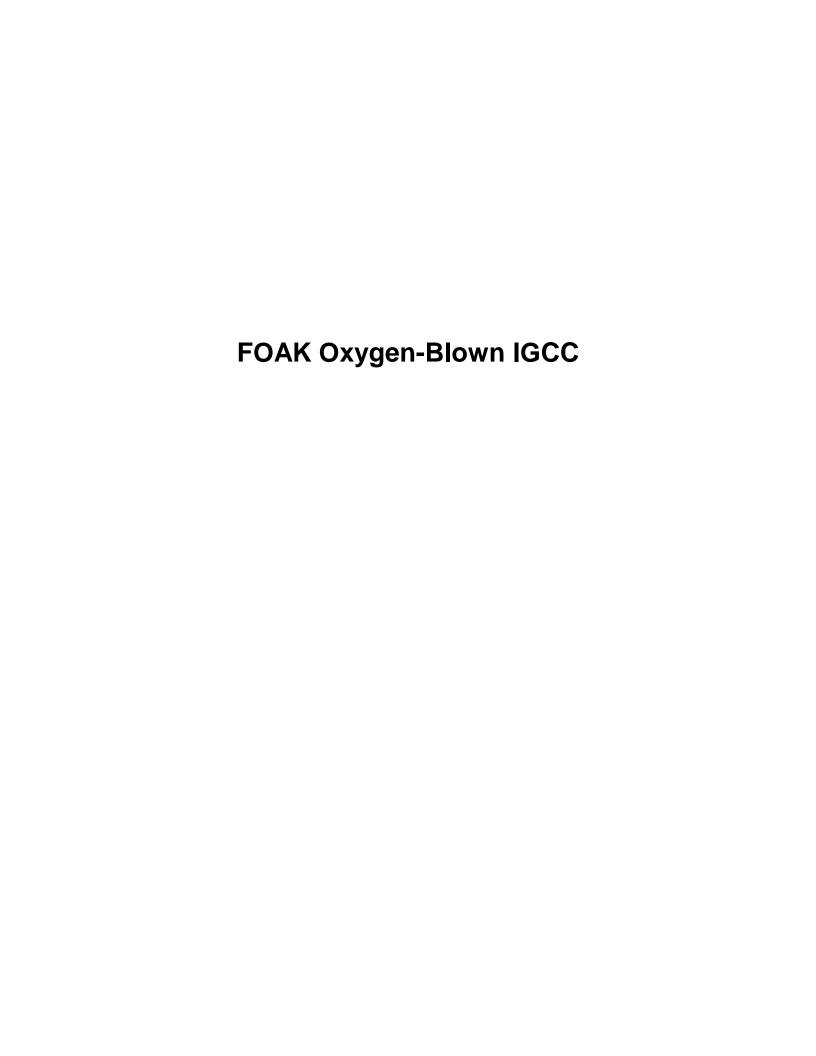
| | Plant Size: | 399.7 | MW,net | Estimate Type: Conceptual | | ptual | Co | Cost Base (Jan) 1998 | | (\$x1000) | | |
|------|--------------------------------|-----------|----------|---------------------------|--------------------------|-------|-----------|----------------------|---------|-------------|-----------|-------|
| Acct | | Equipment | Material | Lak | Labor Sales Bare Erected | | Eng'g CM | Contingencies | | TOTAL PLANT | COST | |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | | | | | | |
| | Generator Equipment | 992 | | 158 | 11 | | \$1,161 | 93 | | 125 | \$1,379 | 3 |
| 11.2 | Station Service Equipment | 2,706 | | 870 | 61 | | \$3,637 | 291 | | 393 | \$4,321 | 11 |
| | Switchgear & Motor Control | 2,157 | | 359 | 25 | | \$2,541 | 203 | | 412 | \$3,156 | 8 |
| | Conduit & Cable Tray | | 1,301 | 4,081 | 286 | | \$5,668 | 453 | | 1,224 | \$7,346 | 18 |
| 11.5 | Wire & Cable | | 1,396 | 1,395 | 98 | | \$2,889 | 231 | | 624 | \$3,744 | 9 |
| | Protective Equipment | 106 | | 354 | 25 | | \$486 | 39 | | 79 | \$603 | 2 |
| | Standby Equipment | 656 | | 15 | 1 | | \$671 | 54 | | 109 | \$834 | 2 |
| | Main Power Transformers | 2,546 | | 118 | 8 | | \$2,673 | 214 | | 433 | \$3,319 | 8 |
| 11.9 | Electrical Foundations | | 162 | 447 | 31 | | \$640 | 51 | | 207 | \$898 | 2 |
| | SUBTOTAL 11. | \$9,164 | \$2,859 | \$7,797 | \$546 | | \$20,365 | \$1,629 | | \$3,606 | \$25,600 | 64 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| | PC Control Equipment | w/12.7 | | w/12.7 | | | | | | | | |
| | Combustion Turbine Control | N/A | | N/A | | | | | | | | |
| | Steam Turbine Control | w/8.1 | | w/8.1 | | | | | | | | |
| | Other Major Component Control | | | | | | | | | | | |
| | Signal Processing Equipment | W/12.7 | | w/12.7 | | | | | | | | |
| | Control Boards, Panels & Racks | 116 | | 68 | 5 | | \$190 | 15 | | 41 | \$246 | 1 |
| | Computer & Accessories | 3,716 | | 136 | 10 | | \$3,862 | 309 | | 417 | \$4,588 | 11 |
| | Instrument Wiring & Tubing | 1,450 | | 4,505 | 315 | | \$6,270 | 502 | | 1,354 | \$8,126 | 20 |
| 12.9 | Other I & C Equipment | 855 | | 380 | 27 | | \$1,262 | 101 | | 136 | \$1,499 | 4 |
| | SUBTOTAL 12. | \$6,138 | | \$5,089 | \$356 | | \$11,584 | \$927 | | \$1,949 | \$14,459 | 36 |
| 13 | IMPROVEMENTS TO SITE | | | | | | | | | | | |
| | Site Preparation | | 32 | 627 | 44 | | \$702 | 56 | | 228 | \$986 | 2 |
| | Site Improvements | | 1,047 | 1,293 | 90 | | \$2,431 | 194 | | 788 | \$3,413 | 9 |
| 13.3 | Site Facilities | 1,877 | | 1,839 | 129 | | \$3,845 | 308 | | 1,246 | \$5,399 | 14 |
| l | SUBTOTAL 13. | \$1,877 | \$1,079 | \$3,759 | \$263 | | \$6,978 | \$558 | | \$2,261 | \$9,798 | 25 |
| 14 | BUILDINGS & STRUCTURES | | | | | | | | | | | |
| | Boiler Building | | 10,456 | 10,955 | 767 | | \$22,178 | 1,774 | | 5,988 | \$29,941 | 75 |
| | Turbine Building | | 3,114 | 4,940 | 346 | | \$8,400 | 672 | | 2,268 | \$11,339 | 28 |
| | Administration Building | | 324 | 408 | 29 | | \$760 | 61 | | 205 | \$1,025 | 3 |
| | Circulation Water Pumphouse | | 23 | 22 | 2 | | \$47 | 4 | | 13 | \$63 | 0 |
| | Water Treatment Buildings | | 225 | 221 | 15 | | \$462 | 37 | | 125 | \$623 | 2 |
| | Machine Shop | | 288 | 231 | 16 | | \$536 | 43 | | 145 | \$723 | 2 |
| | Warehouse | | 196 | 234 | 16 | | \$445 | 36 | | 120 | \$601 | 2 |
| | Other Buildings & Structures | | 120 | 122 | 9 | | \$250 | 20 | | 67 | \$337 | 1 |
| 14.9 | Waste Treating Building & Str. | | 229 | 829 | 58 | | \$1,117 | 89 | | 302 | \$1,508 | 4 |
| | SUBTOTAL 14. | | \$14,976 | \$17,960 | \$1,257 | | \$34,193 | \$2,735 | | \$9,232 | \$46,161 | 115 |
| | TOTAL COST | \$212,688 | \$25,555 | \$129,634 | \$8,928 | | \$376,805 | \$30,144 | | \$60,825 | \$467,774 | 1170 |

| Ultracritical PC Item/Description %P | Contingency Factors(%) rocess %Project |
|--|--|
| | |
| COAL & SORBENT HANDLING | 20.0 |
| COAL & SORBENT PREP & FEED | 20.0 |
| FEEDWATER & MISC. BOP SYSTEMS | 23.2 |
| PC BOILER & ACCESSORIES | |
| PC Boiler | 10.0 |
| Open | |
| Open | |
| Boiler BoP (w/FD & ID Fans) | 10.0 |
| FLUE GAS CLEANUP | 9.4 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | |
| Combustion Turbine Accessories | |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | |
| HRSG Accessories, Ductwork and Stack | 15.5 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 10.0 |
| Turbine Plant Auxiliaries and Steam Piping | 17.2 |
| COOLING WATER SYSTEM | 17.8 |
| ASH/SPENT SORBENT HANDLING SYS | 15.2 |
| ACCESSORY ELECTRIC PLANT | 16.4 |
| INSTRUMENTATION & CONTROL | 15.6 |
| IMPROVEMENTS TO SITE | 30.0 |
| BUILDINGS & STRUCTURES | 25.0 |
| | |

| OPERATING LABOR RI | EQUIREMENTS | |
|--|-----------------------|--------------|
| Ultracritical PC | | |
| Operating Labor Rate(base): | 25.89 \$/hour | |
| Operating Labor Burden: | 30.00 % of bas | e |
| Labor O-H Charge Rate: | 25.00 % of laboration | or |
| Operating Labor Requirements(O.J.)per Shift: | | Total |
| Category | 1 unit/mod. | <u>Plant</u> |
| Skilled Operator | 2.0 | 2.0 |
| Operator | 9.0 | 9.0 |
| Foreman | 1.0 | 1.0 |
| Lab Tech's, etc. | <u>2.0</u> | <u>2.0</u> |
| TOTAL-O.J.'s | 14.0 | 14.0 |

| CONSUMABLES, BY-PRODU | ICTS & FUELS DATA | | |
|---|-------------------|------------|--------|
| Ultracritical PC | | | |
| | Consum | • | Unit |
| Item/Description | <u>Initial</u> | /Day | _Cost_ |
| Water(/1000 gallons) | | 4,625 | 0.80 |
| Chemicals* | | | |
| MU & WT Chem.(lbs)** | 335,843 | 11,195 | 0.16 |
| Limestone (ton)** | 10,885 | 362.8 | 16.25 |
| Formic Acid (lb) | 14,400 | 480.0 | 0.60 |
| Ammonia (NH3) ton | 244 | 8.1 | 32.00 |
| Other Supplemental Fuel(MBtu)** SCR Catalyst Replacement L.P. Steam(/1000 pounds) | | | 1.00 |
| Waste Disposal Sludge(ton) Ash(ton) | | 512 338 | 10.00 |
| By-products & Emissions Total By-products | | | |
| Fuel(ton) | | 3,392 | 29.29 |

| MAINTENANCE FACTORS Ultracritical PC | |
|--|------------------|
| Item/Description | Maintenance % |
| Rolly Docoliption | |
| COAL & SORBENT HANDLING | 2.1 |
| COAL & SORBENT PREP & FEED | 3.7 |
| FEEDWATER & MISC. BOP SYSTEMS | 2.2 |
| PC BOILER & ACCESSORIES | |
| PC Boiler | 3.5 |
| Open | |
| Open | |
| Boiler BoP (w/FD & ID Fans) | 4.5 |
| FLUE GAS CLEANUP | 3.4 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | |
| Combustion Turbine Accessories | |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | |
| HRSG Accessories, Ductwork and Stack | 1.0 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | |
| Turbine Plant Auxiliaries and Steam Piping | 4.2 |
| COOLING WATER SYSTEM | 1.2 |
| ASH/SPENT SORBENT HANDLING SYS | 3.0 |
| ACCESSORY ELECTRIC PLANT | 1.3 |
| INSTRUMENTATION & CONTROL | 1.6 |
| IMPROVEMENTS TO SITE | 0.6 |
| BUILDINGS & STRUCTURES | 1.4 |



| CAPITAL INVESTMENT & | REVENUE REQUIREME | NT SUMMAR | Υ | |
|---|---------------------|-------------|--------------|------------|
| TITLE/DEFINITION | | | | |
| Case: | Destec (2000-90/10) | | | |
| Plant Size: | 543.2 (MW,net) | HeatRate: | 8,522 | (Btu/kWh) |
| Primary/Secondary Fuel(type): | Illnois #6 | Cost: | 1.26 | (\$/MMBtu) |
| Design/Construction: | 3.5 (years) | BookLife: | | (years) |
| TPC(Plant Cost) Year: | 1998 (Jan.) | TPI Year: | | (Jan.) |
| Capacity Factor: | 85 (%) | iii i oai. | 2000 | (Gain) |
| - Capacity : actor: | 33 (70) | | | |
| CAPITAL INVESTMENT | | \$x1000 | | \$/kW |
| Process Capital & Facilities | | 534,667 | | 984.3 |
| Engineering(incl.C.M.,H.O.& Fee) | | 42,773 | | 78.7 |
| Process Contingency | | 14,090 | | 25.9 |
| | | | | |
| Project Contingency | | 82,746 | | 152.3 |
| TOTAL PLANT COST(TPC) | | ¢674 076 | | 1241.3 |
| | ФС 7.4 .070 | \$674,276 | | 1241.3 |
| TOTAL CASH EXPENDED | \$674,276 | | | |
| AFDC | \$67,402 | | | |
| TOTAL PLANT INVESTMENT(TPI) | | \$741,678 | | 1365.4 |
| | | | | |
| Royalty Allowance | | | | |
| Preproduction Costs | | 17,829 | | 32.8 |
| Inventory Capital | | 5,658 | | 10.4 |
| Initial Catalyst & Chemicals(w/equip.) | | | | |
| Land Cost | | 450 | | 0.8 |
| | | | | |
| TOTAL CAPITAL REQUIREMENT(TCR |) | \$765,615 | | 1409.5 |
| OPERATING & MAINTENANCE COSTS (1998 D | ollars) | \$x1000 | | \$/kW-yr |
| Operating Labor | Jonaro j | 5,306 | | 9.8 |
| Maintenance Labor | | , | | |
| | | 4,859 | | 8.9 |
| Maintenance Material | | 7,288 | | 13.4 |
| Administrative & Support Labor | | 2,541 | | 4.7 |
| TOTAL OPERATION & MAINTENANCE | <u> </u> | \$19,995 | | 36.8 |
| FIXED O & M | | | 31.29 | \$/kW-yr |
| VARIABLE O & M | | | 0.07 | ¢/kWh |
| CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars) | \$x1000 | | ¢/kWh |
| Water | (1330 Donais) | 1,188 | | 0.03 |
| Chemicals | | 1,065 | | 0.03 |
| Other Consumables | | 1,005 | | 0.03 |
| | | 1 400 | | 0.04 |
| Waste Disposal | | 1,480 | | 0.04 |
| TOTAL CONSUMABLE OPERATING C | OSTS | \$3,733 | | 0.09 |
| BY-PRODUCT CREDITS (1998 Dollars) | | (\$7,605) | | -0.19 |
| FUEL COST (1998 Dollars) | | \$43,263 | | 1.07 |
| | 4-4 V (000F A) | | 1 /4 Oct - 3 | / (h) |
| DDODUCTION COST SUMMARY | 1st Year (2005 \$) | | zed (10th.) | |
| PRODUCTION COST SUMMARY | <u>¢/kWł</u> | - | ¢/kWh | |
| Fixed O & M | 31.3/kW-yr 0.42 | , | 0.42 | |
| Variable O & M | 0.07 | | 0.07 | |
| Consumables | 0.09 | | 0.09 | |
| By-product Credit | -0.19 |) | -0.19 | |
| Fuel | 0.97 | <u>'</u> | 0.92 | |
| TOTAL PRODUCTION COST | 1.37 | | 1.32 | - |
| LEVELIZED CARRYING CHARGES(Capital) | | 190.3/kW-yr | 2.56 | |
| · | | | | |
| LEVELIZED (10th.Year) BUSBAR COST OF PO | WER | | 3.88 | |
| ELILLE (IVIII.I Gal) BUSDAN COST OF FU | | | 3.00 | |

| ESTIMATE BASIS/FINANCIAL CRITI | ERIA for REVENU | E REQUIR | EMENT CAL | CULATION | IS |
|--|---|------------------|--|-----------------|---|
| GENERAL DATA/CHARACTERISTICS | | | | | |
| Case Title: | D | estec (200 | 0-90/10) | | |
| Unit Size:/Plant Size: | | 543.2 | MW,net | 543.2 | MWe |
| Location: | M | liddletown, | USA | | |
| Fuel: Primary/Secondary | III | Inois #6 | | | |
| Energy From Primary/Secondary Fuels | | 8,522 | Btu/kWh | | Btu/kWh |
| Levelized Capacity Factor / Preproduction(equiv | alent months): | 85 | % | 1 | months |
| Capital Cost Year Dollars (Reference Year Dollar | ars): | 1998 | (January) | | |
| Delivered Cost of Primary/Secondary Fuel | | 1.26 | \$/MBtu | | \$/MBtu |
| Design/Construction Period: | | 3.5 | years | | |
| Plant Startup Date (1st. Year Dollars): | | 2005 | (January) | | |
| Land Area/Unit Cost | | 300 | acre | \$1,500 | /acre |
| FINANCIAL CRITERIA | | | | | |
| Project Book Life: | | 20 | years | | |
| Book Salvage Value: | | | % | | |
| Project Tax Life: | | 20 | years | | |
| Tax Depreciation Method: | A | .ccel. based | d on ACRS Cla | ass | |
| Property Tax Rate: | | 1.0 | % per year | | |
| Insurance Tax Rate: | | 1.0 | % per year | | |
| Federal Income Tax Rate: | | 34.0 | % | | |
| State Income Tax Rate: | | 6.0 | % | | |
| Investment Tax Credit/% Eligible | | | % | | % |
| Economic Basis: | | 10th.Year | Constant Dolla | ars | |
| Capital Structure Common Equity Preferred Stock | 9, | % of Total 20 | _ | Cost(%) 16.5 | |
| Debt Weighted Cost of Capital:(after tax) | | 80 | 6.2 % | 5.8 | |
| Escalation Rates | <u>O</u> General Primary Fuel Secondary Fuel | -1.1 | fe 1 % per year % per year % per year | | 5 % per year % per year % per year |

 Client:
 DEPARTMENT OF ENERGY
 Report Date:
 14-Aug-98

 Project:
 Market Based Advanced Coal Power Systems
 10:59 AM

TOTAL PLANT COST SUMMARY

 Case:
 Destec (2000-90/10)

 Plant Size:
 543.2 MW,net

Plant Size: 543.2 MW, net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| Acct | | Equipment | Material | Lab | or | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
|----------|--|------------------------------------|----------------|--------------------------------|--------------------------|-------|--|---------------------------------|----------------|--------------------------------|---|-------------------------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | 7,603 | 1,526 | 6,640 | 465 | | \$16,233 | 1,299 | | 3,506 | \$21,038 | 39 |
| 2 | COAL & SORBENT PREP & FEED | 11,480 | 2,641 | 12,398 | 868 | | \$27,387 | 2,191 | 919 | 4,022 | \$34,519 | 64 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 8,097 | 4,016 | 6,386 | 447 | | \$18,946 | 1,516 | | 4,893 | \$25,354 | 47 |
| 4.2 | GASIFIER & ACCESSORIES Gasifier & Auxiliaries(Destec) High Temperature Cooling | 15,536 24,846 | | 15,824 25,317 | 1,108 1,772 | | \$32,468 \$51,935 | 2,597 4,155 | 1,623 2,597 | 3,669 5,869 | \$40,358 \$64,555 | 74 119 |
| | ASU/Oxidant Compression Other Gasification Equipment SUBTOTAL 4 | 69,266 12,543 <i>122,191</i> | 4,800 4,800 | w/equip. 11,788 52,930 | 825 3,705 | | \$69,266 \$29,956 \$183,625 | 5,541 2,396 <i>14,690</i> | 1,113 5,334 | 7,481 4,744 21,762 | \$82,288 \$38,210 \$225,411 | 151 70 <i>415</i> |
| 5 | HOT GAS CLEANUP & PIPING | 37,832 | 2,554 | 9,016 | 631 | | \$50,033 | 4,003 | 4,093 | 11,819 | \$69,948 | 129 |
| 6 | COMBUSTION TURBINE/ACCESSORIE Combustion Turbine Generator | 61,888 | | 3,868 | 271 | | \$66,026 | 5,282 | 3.301 | 7,461 | \$82,071 | 151 |
| | Combustion Turbine Accessories SUBTOTAL 6 | 61,888 | 222 222 | 256 4,124 | 18 289 | | \$496 \$66,522 | 40 5,322 | 3,301 | 161 7,622 | \$696 \$82,767 | 1 1 152 |
| 7 | HRSG, DUCTING & STACK | 04 700 | | 0.440 | 040 | | *05.040 | 0.000 | | 0.704 | **** | |
| | Heat Recovery Steam Generator HRSG Accessories, Ductwork and Stack SUBTOTAL 7 | 21,702 3,281 <i>24,983</i> | 2,209 2,209 | 3,119 3,165 <i>6,284</i> | 218 222 <i>440</i> | | \$25,040 \$8,877 <i>\$33,917</i> | 2,003 710 2,713 | | 2,704 1,455 <i>4,159</i> | \$29,748 \$11,042 <i>\$40,790</i> | 55 20 <i>75</i> |
| 8 8.1 | STEAM TURBINE GENERATOR Steam TG & Accessories | 19,353 | | 3,189 | 223 | | \$22,765 | 1,821 | | 2,459 | \$27,045 | 50 |
| 8.2-8.9 | Turbine Plant Auxiliaries and Steam Piping SUBTOTAL 8 | 8,114 27,467 | 247 247 | 4,450 7,638 | 311 535 | | \$13,122 \$35,887 | 1,050 2,871 | | 2,440 4,899 | \$16,612 \$43,657 | 31 <i>80</i> |
| 9 | COOLING WATER SYSTEM | 5,766 | 3,281 | 5,428 | 380 | | \$14,855 | 1,188 | | 2,892 | \$18,935 | 35 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | 5,750 | 883 | 5,042 | 353 | | \$12,027 | 962 | 442 | 1,526 | \$14,958 | 28 |
| 11 | ACCESSORY ELECTRIC PLANT | 18,990 | 5,447 | 14,090 | 986 | | \$39,514 | 3,161 | | 6,985 | \$49,660 | 91 |
| 12 | INSTRUMENTATION & CONTROL | 5,902 | 1,654 | 6,143 | 430 | | \$14,129 | 1,130 | | 2,371 | \$17,630 | 32 |
| 13 | IMPROVEMENTS TO SITE | 2,294 | 1,319 | 4,595 | 322 | | \$8,530 | 682 | | 2,764 | \$11,976 | 22 |
| 14 | BUILDINGS & STRUCTURES | | 5,432 | 7,129 | 499 | | \$13,060 | 1,045 | | 3,526 | \$17,631 | 32 |
| | TOTAL COST | \$340,244 | \$36,230 | \$147,844 | \$10,349 | | \$534,667 | \$42,773 | \$14,090 | \$82,746 | \$674,276 | 1241 |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98 10:59 AM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Destec (2000-90/10) 543.2 MW,net Case:

Plant Size: Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| | Flant Size. | 0 10.2 | ivivv ,riet | | nate Type. | 001100 | ptdui | 00 | St Dase (Jail) | 1330 | (ΦΧ1000) | |
|-----|------------------------------------|-----------|-------------|-----------|------------|--------|--------------|-----------|----------------|----------|-------------|-------|
| Acc | | Equipment | Material | Lak | oor | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | | | | | | | | | - | | |
| 1. | 1 Coal Receive & Unload | 1,997 | | 1,099 | 77 | | \$3,172 | 254 | | 685 | \$4,111 | 8 |
| 1. | 2 Coal Stackout & Reclaim | 2,580 | | 704 | 49 | | \$3,334 | 267 | | 720 | \$4,320 | 8 |
| 1. | 3 Coal Conveyors & Yd Crush | 2,399 | | 697 | 49 | | \$3,144 | 252 | | 679 | \$4,075 | 8 |
| 1. | 4 Other Coal Handling | 628 | | 161 | 11 | | \$800 | 64 | | 173 | \$1,037 | 2 |
| 1. | 5 Sorbent Receive & Unload | | | | | | | | | | . , | |
| 1. | Sorbent Stackout & Reclaim | | | | | | | | | | | |
| 1. | 7 Sorbent Conveyors | | | | | | | | | | | |
| 1. | 8 Other Sorbent Handling | | | | | | | | | | | |
| 1. | 9 Coal & Sorbent Hnd.Foundations | | 1,526 | 3,978 | 278 | | \$5,783 | 463 | | 1,249 | \$7,495 | 14 |
| | SUBTOTAL 1. | \$7,603 | \$1,526 | \$6,640 | \$465 | | \$16,233 | \$1,299 | | \$3,506 | \$21,038 | 39 |
| 2 | COAL & SORBENT PREP & FEED | | · | | | | | | | | | |
| 2. | 1 Coal Crushing & Drying | 1,592 | 248 | 597 | 42 | | \$2,479 | 198 | | 535 | \$3,212 | 6 |
| 2. | 2 Prepared Coal Storage & Feed | 548 | 123 | 97 | 7 | | \$774 | 62 | | 167 | \$1,003 | 2 |
| 2. | 3 Slurry Prep & Feed | 8,876 | | 8,891 | 622 | | \$18,389 | 1,471 | 919 | 2,078 | \$22,857 | 42 |
| 2. | 4 Misc.Coal Prep & Feed | 465 | 317 | 1,143 | 80 | | \$2,005 | 160 | | 433 | \$2,598 | 5 |
| 2. | 5 Sorbent Prep Equipment | | | | | | | | | | | |
| 2. | 6 Sorbent Storage & Feed | | | | | | | | | | | |
| 2. | 7 Sorbent Injection System | | | | | | | | | | | |
| 2. | B Booster Air Supply System | | | | | | | | | | | |
| 2. | 9 Coal & Sorbent Feed Foundation | | 1,953 | 1,671 | 117 | | \$3,741 | 299 | | 808 | \$4,849 | 9 |
| | SUBTOTAL 2. | \$11,480 | \$2,641 | \$12,398 | \$868 | | \$27,387 | \$2,191 | \$919 | \$4,022 | \$34,519 | 64 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | | | | | | | | | | | |
| 3. | 1 FeedwaterSystem | 1,163 | 2,262 | 1,207 | 85 | | \$4,718 | 377 | | 1,019 | \$6,114 | 11 |
| 3. | 2 Water Makeup & Pretreating | 588 | 62 | 338 | 24 | | \$1,012 | 81 | | 328 | \$1,421 | 3 |
| 3. | 3 Other Feedwater Subsystems | 692 | 259 | 235 | 16 | | \$1,203 | 96 | | 260 | \$1,559 | 3 |
| | 4 Service Water Systems | 45 | 97 | 341 | 24 | | \$507 | 41 | | 164 | \$712 | 1 |
| | 5 Other Boiler Plant Systems | 1,923 | 776 | 1,945 | 136 | | \$4,781 | 383 | | 1,033 | \$6,197 | 11 |
| 3. | 6 FO Supply Sys & Nat Gas | 125 | 236 | 444 | 31 | | \$836 | 67 | | 181 | \$1,083 | 2 |
| | 7 Waste Treatment Equipment | 1,169 | | 685 | 48 | | \$1,902 | 152 | | 616 | \$2,671 | 5 |
| 3. | 8 Misc. Power Plant Equipment | 2,390 | 323 | 1,191 | 83 | | \$3,987 | 319 | | 1,292 | \$5,598 | 10 |
| | SUBTOTAL 3. | \$8,097 | \$4,016 | \$6,386 | \$447 | | \$18,946 | \$1,516 | | \$4,893 | \$25,354 | 47 |
| 4 | GASIFIER & ACCESSORIES | | | | | | | | | | | |
| | 1 Gasifier & Auxiliaries(Destec) | 15,536 | | 15,824 | 1,108 | | \$32,468 | 2,597 | 1,623 | 3,669 | \$40,358 | 74 |
| | 2 High Temperature Cooling | 24,846 | | 25,317 | 1,772 | | \$51,935 | 4,155 | 2,597 | 5,869 | \$64,555 | 119 |
| | 3 ASU/Oxidant Compression | 69,266 | , | w/equip. | | | \$69,266 | 5,541 | | 7,481 | \$82,288 | 151 |
| | 4 LT Heat Recovery & FG Saturation | 12,543 | | 9,088 | 636 | | \$22,267 | 1,781 | 1,113 | 2,516 | \$27,678 | 51 |
| | 5 Misc. Gasification Equipment | w/4.1&4.2 | | w/4.1&4.2 | | | | | | | 1 | |
| | 6 Other Gasification Equipment | | 846 | 348 | 24 | | \$1,219 | 98 | | 132 | \$1,448 | 3 |
| | 8 Major Component Rigging | w/4.1&4.2 | | w/4.1&4.2 | | | | | | | | |
| 4. | 9 Gasification Foundations | | 3,953 | 2,352 | 165 | | \$6,470 | 518 | | 2,096 | \$9,083 | 17 |
| | SUBTOTAL 4. | \$122,191 | \$4,800 | \$52,930 | \$3,705 | | \$183,625 | \$14,690 | \$5,334 | \$21,762 | \$225,411 | 415 |

Client: DEPARTMENT OF ENERGY

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

 Case:
 Destec (2000-90/10)

 Plant Size:
 543.2 MW,net

 Plant Size:
 543.2 MW, net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998 (\$x1000)

| A | I | Familia mana a sa | Matarial | 1 | | Calar | es Bare Erected Eng'g CM Contingencies | | TOTAL PLANT COST | | | |
|-------------|---------------------------------|-------------------|------------------|---------------|-----------------|--------------|--|-----------|------------------|----------------|----------|---------|
| Acct No. | Item/Description | Equipment Cost | Material Cost | Lab Direct | oor Indirect | Sales Tax | Cost \$ | H.O.& Fee | | | \$ | \$/kW |
| NO. | item/Description | Cost | Cost | Direct | indirect | ıax | Cost \$ | H.O.& Fee | Process | Project | a a | J ⊅/KVV |
| 5 | HOT GAS CLEANUP & PIPING | | | | | | | | | | | |
| | MDEA-LT AGR | 9.942 | | | | | \$9.942 | 795 | 497 | 2.247 | \$13,481 | 25 |
| | Sulfur Recovery (Sulfuric Acid) | 18,151 | | 5,744 | 402 | | \$24,297 | 1,944 | 1,215 | 5,491 | \$32,947 | 61 |
| | Chloride Guard | 4,376 | | 1,039 | 73 | | \$5,487 | 439 | 1,372 | 1,460 | \$8,757 | 16 |
| | Particulate Removal | 3,799 | | 485 | 34 | | \$4,318 | 345 | 648 | 1,062 | \$6,373 | 12 |
| | Blowback Gas Systems | 1,565 | 527 | 300 | 21 | | \$2,412 | 193 | 362 | 593 | \$3,561 | 7 |
| | Fuel Gas Piping | 1,505 | 987 | 750 | 52 | | \$1.789 | 143 | 302 | 387 | \$2,319 | 4 |
| | HGCU Foundations | | 1.040 | 699 | 49 | | \$1.788 | 143 | | 579 | \$2,510 | 5 |
| 3.3 | SUBTOTAL 5. | \$37,832 | \$2,554 | \$9,016 | \$631 | | \$50,033 | \$4,003 | \$4,093 | \$11,819 | \$69,948 | |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | Ψ2,004 | ψ3,010 | ΨΟΟΙ | | ψ50,055 | ψ4,003 | ψ4,033 | Ψ11,013 | ψ03,340 | 123 |
| | Combustion Turbine Generator | 61,888 | | 3.868 | 271 | | \$66.026 | 5,282 | 3,301 | 7,461 | \$82,071 | 151 |
| | Combustion Turbine Accessories | w/6.1 | | w/6.1 | 271 | | \$00,020 | 3,202 | 3,301 | 7,401 | ψ02,071 | 131 |
| | Compressed Air Piping | W/O. 1 | | W/O. I | | | | | | | | |
| | Combustion Turbine Foundations | | 222 | 256 | 18 | | \$496 | 40 | | 161 | \$696 | 1 |
| 0.3 | SUBTOTAL 6. | \$61.888 | \$222 | \$4,124 | \$289 | | \$66,522 | \$5,322 | \$3,301 | \$7,622 | \$82.767 | 152 |
| 7 | HRSG, DUCTING & STACK | Ψ01,000 | ΨΖΖΖ | Ψ4,124 | Ψ203 | | \$00,522 | Ψ5,522 | ψ5,501 | Ψ1,022 | ψ02,707 | 132 |
| 1 | Heat Recovery Steam Generator | 21,702 | | 3,119 | 218 | | \$25,040 | 2,003 | | 2,704 | \$29,748 | 55 |
| | HRSG Accessories | 21,702 | | 3,113 | 210 | | Ψ25,040 | 2,000 | | 2,704 | Ψ25,740 | 33 |
| 1 | Ductwork | | 2,048 | 1,758 | 123 | | \$3,928 | 314 | | 849 | \$5,091 | 9 |
| | Stack | 3,281 | 2,040 | 1,736 | 87 | | \$4,615 | 369 | | 498 | \$5,482 | 10 |
| | HRSG,Duct & Stack Foundations | 3,201 | 161 | 1,240 | 11 | | \$334 | 27 | | 108 | \$469 | 10 |
| 1.9 | SUBTOTAL 7. | \$24,983 | \$2,209 | \$6,284 | \$440 | | \$33,917 | \$2,713 | | \$4,159 | \$40,790 | |
| 8 | STEAM TURBINE GENERATOR | \$24,903 | \$2,209 | ⊅0,∠04 | \$440 | | \$33,917 | \$2,713 | | \$4,139 | \$40,790 | 75 |
| 1 - | | 10.252 | | 2 1 0 0 | 223 | | \$22.765 | 1 001 | | 2.450 | \$27.04E | E0 |
| - | Steam TG & Accessories | 19,353 | | 3,189 | | | | 1,821 | | 2,459 | \$27,045 | 50 |
| 1 | Turbine Plant Auxiliaries | 128 | | 297 | 21 | | \$446 | 36 | | 48 | \$529 | 1 |
| 8.3 | | 3,300 | | 913 | 64 | | \$4,277 | 342 | | 462 | \$5,081 | 9 |
| | Steam Piping | 4,685 | 0.47 | 2,468 | 173 | | \$7,326 | 586 | | 1,583 | \$9,495 | 17 |
| 8.9 | | | 247 | 772 | 54 | | \$1,073 | 86 | | 348 | \$1,506 | 3 |
| | SUBTOTAL 8. | \$27,467 | \$247 | \$7,638 | \$535 | | \$35,887 | \$2,871 | | \$4,899 | \$43,657 | 80 |
| 9 | COOLING WATER SYSTEM | | | | | | A= 000 | | | | *** | |
| | Cooling Towers | 4,315 | | 957 | 67 | | \$5,339 | 427 | | 577 | \$6,343 | |
| | Circulating Water Pumps | 631 | | 60 | 4 | | \$696 | 56 | | 75 | \$826 | |
| | Circ.Water System Auxiliaries | 77 | | . 11 | 1 | | \$89 | 7 | | _10 | \$106 | |
| | Circ.Water Piping | | 1,496 | 1,682 | 118 | | \$3,296 | 264 | | 712 | \$4,271 | 8 |
| | Make-up Water System | 172 | | 257 | 18 | | \$447 | 36 | | 97 | \$579 | 1 |
| | Component Cooling Water Sys | 571 | 683 | 507 | 36 | | \$1,798 | 144 | | 388 | \$2,330 | 4 |
| 9.9 | Circ.Water System Foundations | | 1,102 | 1,953 | 137 | | \$3,191 | 255 | | 1,034 | \$4,480 | 8 |
| | SUBTOTAL 9. | \$5,766 | \$3,281 | \$5,428 | \$380 | | \$14,855 | \$1,188 | | \$2,892 | \$18,935 | 35 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | | | | | | | | | | | |
| | Slag Dewatering & Cooling | 4,279 | | 4,266 | 299 | | \$8,843 | 707 | 442 | 999 | \$10,992 | 20 |
| 10.2 | Gasifier Ash Depressurization | | | | | | | | | | | |
| | Cleanup Ash Depressurization | 1 | | | | | | | | | | |
| 10.4 | High Temperature Ash Piping | 1 | | | | | | | | | | |
| 10.5 | Other Ash Recovery Equipment | | | | | | | | | | | |
| 10.6 | Ash Storage Silos | 336 | | 370 | 26 | | \$732 | 59 | | 119 | \$910 | 2 |
| 10.7 | Ash Transport & Feed Equipment | 438 | | 110 | 8 | | \$556 | 44 | | 90 | \$691 | 1 |
| 10.8 | Misc. Ash Handling Equipment | 697 | 854 | 258 | 18 | | \$1,827 | 146 | | 296 | \$2,269 | 4 |
| | Ash/Spent Sorbent Foundation | 1 | 29 | 38 | 3 | | \$69 | 6 | | 22 | \$97 | 0 |
| | SUBTOTAL 10. | \$5,750 | \$883 | \$5,042 | \$353 | | \$12,027 | \$962 | \$442 | \$1,526 | \$14,958 | 28 |
| | | | | | | | | | | | | |

14-Aug-98

10:59 AM

 Client:
 DEPARTMENT OF ENERGY
 Report Date:
 14-Aug-98

 Project:
 Market Based Advanced Coal Power Systems
 10.59 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2000-90/10)

 Plant Size:
 543.2 MW net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998
 (\$x1000)

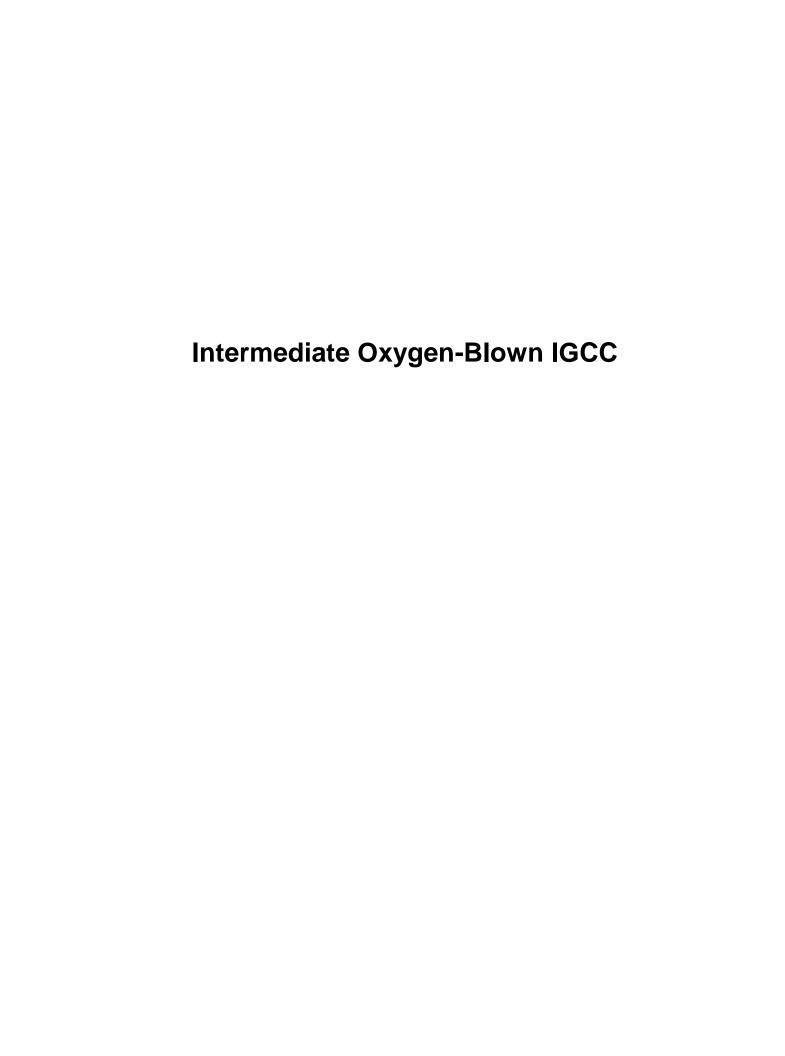
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|------|--------------------------------|-----------|----------|-----------|------------|-------|--------------|-----------|----------|----------|-------------|-------|
| Acct | | Equipment | Material | Lab | | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | | | | - | | |
| 11.1 | Generator Equipment | 2,671 | | 530 | 37 | | \$3,239 | 259 | | 350 | \$3,848 | 7 |
| 11.2 | Station Service Equipment | 4,944 | | 408 | 29 | | \$5,381 | 430 | | 581 | \$6,392 | 12 |
| 11.3 | Switchgear & Motor Control | 3,942 | | 656 | 46 | | \$4,643 | 371 | | 752 | \$5,767 | 11 |
| 11.4 | Conduit & Cable Tray | | 2,377 | 7,458 | 522 | | \$10,357 | 829 | | 2,237 | \$13,422 | 25 |
| 11.5 | Wire & Cable | | 2,552 | 2,548 | 178 | | \$5,278 | 422 | | 1,140 | \$6,840 | 13 |
| 11.6 | Protective Equipment | | 198 | 659 | 46 | | \$903 | 72 | | 146 | \$1,122 | 2 |
| 11.7 | Standby Equipment | 801 | | 18 | 1 | | \$820 | 66 | | 133 | \$1,019 | 2 |
| 11.8 | Main Power Transformers | 6,631 | | 930 | 65 | | \$7,626 | 610 | | 1,235 | \$9,472 | 17 |
| 11.9 | Electrical Foundations | | 320 | 884 | 62 | | \$1,267 | 101 | | 410 | \$1,778 | |
| | SUBTOTAL 11. | \$18,990 | \$5,447 | \$14,090 | \$986 | | \$39,514 | \$3,161 | | \$6,985 | \$49,660 | 91 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| 12.1 | IGCC Control Equipment | | | | | | | | | | | |
| 12.2 | Combustion Turbine Control | | | | | | | | | | | |
| 12.3 | Steam Turbine Control | | | | | | | | | | | |
| 12.4 | Other Major Component Control | 554 | | 338 | 24 | | \$916 | 73 | | 148 | \$1,138 | 2 |
| 12.5 | Signal Processing Equipment | W/12.7 | | w/12.7 | | | | | | | | |
| 12.6 | Control Boards, Panels & Racks | 133 | | 78 | 5 | | \$216 | 17 | | 47 | \$280 | 1 |
| 12.7 | Computer & Accessories | 4,239 | | 155 | 11 | | \$4,405 | 352 | | 476 | \$5,233 | 10 |
| 12.8 | Instrument Wiring & Tubing | | 1,654 | 5,139 | 360 | | \$7,152 | 572 | | 1,545 | \$9,269 | 17 |
| 12.9 | Other I & C Equipment | 975 | | 433 | 30 | | \$1,439 | 115 | | 155 | \$1,710 | 3 |
| | SUBTOTAL 12. | \$5,902 | \$1,654 | \$6,143 | \$430 | | \$14,129 | \$1,130 | | \$2,371 | \$17,630 | 32 |
| 13 | IMPROVEMENTS TO SITE | | | | | | | | | | | |
| 13.1 | Site Preparation | | 39 | 766 | 54 | | \$859 | 69 | | 278 | \$1,206 | |
| 13.2 | Site Improvements | | 1,280 | 1,580 | 111 | | \$2,971 | 238 | | 963 | \$4,171 | 8 |
| 13.3 | Site Facilities | 2,294 | | 2,248 | 157 | | \$4,700 | 376 | | 1,523 | \$6,599 | |
| | SUBTOTAL 13. | \$2,294 | \$1,319 | \$4,595 | \$322 | | \$8,530 | \$682 | | \$2,764 | \$11,976 | 22 |
| 14 | BUILDINGS & STRUCTURES | | | | | | | | | | | |
| | Combustion Turbine Area | | 269 | 169 | 12 | | \$450 | 36 | | 122 | \$608 | |
| 14.2 | Steam Turbine Building | | 2,508 | 3,978 | 278 | | \$6,765 | 541 | | 1,827 | \$9,133 | 17 |
| | Administration Building | | 493 | 398 | 28 | | \$919 | 74 | | 248 | \$1,241 | 2 |
| | Circulation Water Pumphouse | | 97 | 57 | 4 | | \$158 | 13 | | 43 | \$214 | |
| | Water Treatment Buildings | | 615 | 668 | 47 | | \$1,330 | 106 | | 359 | \$1,795 | |
| | Machine Shop | | 252 | 192 | 13 | | \$458 | 37 | | 124 | \$619 | |
| | Warehouse | | 407 | 293 | 21 | | \$721 | 58 | | 195 | \$973 | |
| | Other Buildings & Structures | | 244 | 212 | 15 | | \$470 | 38 | | 127 | \$635 | |
| 14.9 | Waste Treating Building & Str. | | 546 | 1,161 | 81 | | \$1,788 | 143 | | 483 | \$2,414 | 4 |
| | SUBTOTAL 14. | | \$5,432 | \$7,129 | \$499 | | \$13,060 | \$1,045 | | \$3,526 | \$17,631 | 32 |
| | | | | | | | | | | | | |
| | TOTAL COST | \$340,244 | \$36,230 | \$147,844 | \$10,349 | | \$534,667 | \$42,773 | \$14,090 | \$82,746 | \$674,276 | 1241 |

| CONTINGENCY FACTORS Destec (2000-90/10) | | | | | | | | | | |
|--|----------------------|----------------------------|--|--|--|--|--|--|--|--|
| Item/Description | Contingency %Process | Factors(%) <u>%Project</u> | | | | | | | | |
| item/Description | 701 10cess | <u>//// TOJECT</u> | | | | | | | | |
| COAL & SORBENT HANDLING | | 20.0 | | | | | | | | |
| COAL & SORBENT PREP & FEED | 3.4 | 13.2 | | | | | | | | |
| FEEDWATER & MISC. BOP SYSTEMS | | 23.9 | | | | | | | | |
| GASIFIER & ACCESSORIES | | | | | | | | | | |
| Gasifier & Auxiliaries(Destec) | 5.0 | 10.0 | | | | | | | | |
| High Temperature Cooling | 5.0 | 10.0 | | | | | | | | |
| ASU/Oxidant Compression | | 10.0 | | | | | | | | |
| Other Gasification Equipment | 3.7 | 14.2 | | | | | | | | |
| HOT GAS CLEANUP & PIPING | 8.2 | 20.3 | | | | | | | | |
| COMBUSTION TURBINE/ACCESSORIES | | | | | | | | | | |
| Combustion Turbine Generator | 5.0 | 10.0 | | | | | | | | |
| Combustion Turbine Accessories | | 30.0 | | | | | | | | |
| HRSG, DUCTING & STACK | | | | | | | | | | |
| Heat Recovery Steam Generator | | 10.0 | | | | | | | | |
| HRSG Accessories, Ductwork and Stack | | 15.2 | | | | | | | | |
| STEAM TURBINE GENERATOR | | | | | | | | | | |
| Steam TG & Accessories | | 10.0 | | | | | | | | |
| Turbine Plant Auxiliaries and Steam Piping | | 17.2 | | | | | | | | |
| COOLING WATER SYSTEM | | 18.0 | | | | | | | | |
| ASH/SPENT SORBENT HANDLING SYS | 3.7 | 11.4 | | | | | | | | |
| ACCESSORY ELECTRIC PLANT | | 16.4 | | | | | | | | |
| INSTRUMENTATION & CONTROL | | 15.5 | | | | | | | | |
| IMPROVEMENTS TO SITE | | 30.0 | | | | | | | | |
| BUILDINGS & STRUCTURES | | 25.0 | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

| OPERATING LABOR REQUIREMENTS | | | | | | | | | | | |
|--|----------------|--------------|--|--|--|--|--|--|--|--|--|
| Destec (2000-90/10) | | | | | | | | | | | |
| Operating Labor Rate(base): | 25.89 \$/hour | | | | | | | | | | |
| Operating Labor Burden: | 30.00 % of bas | se | | | | | | | | | |
| Labor O-H Charge Rate: | 25.00 % of lab | or | | | | | | | | | |
| Operating Labor Requirements(O.J.)per Shift: | | Total | | | | | | | | | |
| Category | 1 unit/mod. | <u>Plant</u> | | | | | | | | | |
| Skilled Operator | 2.0 | 2.0 | | | | | | | | | |
| Operator | 12.0 | 12.0 | | | | | | | | | |
| Foreman | 1.0 | 1.0 | | | | | | | | | |
| Lab Tech's, etc. | <u>3.0</u> | <u>3.0</u> | | | | | | | | | |
| TOTAL-O.J.'s | 18.0 | 18.0 | | | | | | | | | |

| CONSUMABLES, BY-PRODUCTS & F | FUELS DATA | | |
|---|----------------|--------|--------|
| Destec (2000-90/10) | | | |
| | Consun | • | Unit |
| Item/Description | <u>Initial</u> | /Day | _Cost_ |
| Water(/1000 gallons) | | 4,785 | 0.80 |
| Chemicals | | | |
| MU & WT Chem.(lbs) | 427,634 | 14,254 | 0.16 |
| Limestone (ton) | , | , - | 16.25 |
| Amine Makeup (lb)** | 511 | 17.0 | 1.30 |
| Nahcolite(ton) | 132 | 4.4 | 270.00 |
| Other Supplemental Fuel(MBtu) Gases,N2 etc.(/100scf) L.P. Steam(/1000 pounds) | | | 1.50 |
| Waste Disposal | | | |
| Sludge(ton) Slag(ton) | | 477 | 10.00 |
| By-products & Emissions Sulfuric Acid(tons) | | 360 | 68.00 |
| Fuel(ton) | | 4,762 | 29.29 |

| MAINTENANCE FACTORS Destec (2000-90/10) | |
|--|-------------|
| Item/Description | Maintenance |
| · | |
| COAL & SORBENT HANDLING | 2.0 |
| COAL & SORBENT PREP & FEED | 2.9 |
| FEEDWATER & MISC. BOP SYSTEMS | 2.0 |
| GASIFIER & ACCESSORIES | |
| Gasifier & Auxiliaries(Destec) | 5.0 |
| High Temperature Cooling | 4.5 |
| ASU/Oxidant Compression | 4.0 |
| Other Gasification Equipment | 3.5 |
| HOT GAS CLEANUP & PIPING | 4.3 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | 9.0 |
| Combustion Turbine Accessories | 0.5 |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | 2.0 |
| HRSG Accessories, Ductwork and Stack | 1.5 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 1.5 |
| Turbine Plant Auxiliaries and Steam Piping | 1.7 |
| COOLING WATER SYSTEM | 1.3 |
| ASH/SPENT SORBENT HANDLING SYS | 3.0 |
| ACCESSORY ELECTRIC PLANT | 1.5 |
| INSTRUMENTATION & CONTROL | 1.6 |
| IMPROVEMENTS TO SITE | 1.2 |
| BUILDINGS & STRUCTURES | 1.4 |
| | |
| | |



| CAPITAL INVESTMENT & | REVENUE REQUIREME | NT SUMMAR | Υ | |
|--|----------------------------------|-------------------------|----------------------|------------------|
| TITLE/DEFINITION | | | | |
| Case: | Destec (2005-80/20) | | | |
| Plant Size: | 349.2 (MW,net) | HeatRate: | 7,513 (E | Stu/kWh) |
| Primary/Secondary Fuel(type): | Illnois #6 | Cost: | | S/MMBtu) |
| Design/Construction: | 2.5 (years) | BookLife: | 20 (y | /ears) |
| TPC(Plant Cost) Year: | 1998 (Jan.) | TPI Year: | 2005 (| Jan.) |
| Capacity Factor: | 85 (%) | | | |
| CAPITAL INVESTMENT | | \$x1000 | | \$/kW |
| Process Capital & Facilities | | 334,677 | | 958.4 |
| Engineering(incl.C.M.,H.O.& Fee) | | 26,774 | | 76.7 |
| Process Contingency | | 13,564 | | 38.8 |
| Project Contingency | | 54,240 | _ | 155.3 |
| TOTAL PLANT COST(TPC) | | \$429,256 | | 1229.2 |
| TOTAL CASH EXPENDED | \$429,256 | | | |
| AFDC | \$26,438 | | | |
| TOTAL PLANT INVESTMENT(TPI) | 420 , 100 | \$455,694 | | 1304.9 |
| Dovolty Alloyenge | | | | |
| Royalty Allowance Preproduction Costs | | 11,156 | | 31.9 |
| Inventory Capital | | 3,371 | | 9.7 |
| Initial Catalyst & Chemicals(w/equip.) | | • | | |
| Land Cost | | 450 | _ | 1.3 |
| TOTAL CAPITAL REQUIREMENT(TCR |) | \$470,670 | | 1347.8 |
| ODED ATIMO & MAINTENANCE COSTS (4000 D | Aollara) | \$x1000 | | ¢/14\A/ xm |
| OPERATING & MAINTENANCE COSTS (1998 D Operating Labor | ioliais) | <u>эх гооо</u> 4,717 | | \$/kW-yr 13.5 |
| Maintenance Labor | | 3,174 | | 9.1 |
| Maintenance Material | | 4,761 | | 13.6 |
| Administrative & Support Labor | | 1,973 | _ | 5.6 |
| TOTAL OPERATION & MAINTENANCE | <u> </u> | \$14,625 | | 41.9 |
| FIXED O & M | | | 35.60 \$ | /kW-yr |
| VARIABLE O & M | | | 0.08 ¢ | /kWh |
| CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars) | \$x1000 | | ¢/kWh |
| Water | | 632 | | 0.02 |
| Chemicals | | 1,358 | | 0.05 |
| Other Consumables Waste Disposal | | 834 | | 0.03 |
| Waste Disposal | | | _ | 0.03 |
| TOTAL CONSUMABLE OPERATING C | OSTS | \$2,825 | | 0.11 |
| BY-PRODUCT CREDITS (1998 Dollars) | | (\$4,352) | | -0.17 |
| FUEL COST (1998 Dollars) | | \$24,520 | | 0.94 |
| | 1st Year (2005 \$) | | zed (10th.Ye | ar \$) |
| PRODUCTION COST SUMMARY Fixed O & M | ¢/kW h 35.6/kW-yr 0.48 | - | <u>¢/kWh</u> 0.48 | |
| | , | , | | |
| Variable O & M Consumables | 0.08 | | 0.08 0.11 | |
| By-product Credit | -0.17 | | -0.17 | |
| Fuel | 0.86 | | -0.17 0.81 | |
| TOTAL PRODUCTION COST | 1.36 | | 1.32 | |
| LEVELIZED CARRYING CHARGES(Capital) | | 182.0/kW-yr | 2.44 | |
| LEVELIZED (10th Voor) BUSBAR COST OF BO | WED | | 0.76 | |
| LEVELIZED (10th.Year) BUSBAR COST OF PO | NA CU | | 3.76 | |

| ESTIMATE BASIS/FINANCIAL CRIT | ERIA for REVEN | UE REQUIR | REMENT CAI | LCULATION | NS |
|---|---|------------------|---|-----------------|---|
| GENERAL DATA/CHARACTERISTICS | | | | | |
| Case Title: | | Destec (200 | 5-80/20) | | |
| Unit Size:/Plant Size: | | 349.2 | MW,net | 349.2 | MWe |
| Location: | | Middletown, | USA | | |
| Fuel: Primary/Secondary | | Illnois #6 | | | |
| Energy From Primary/Secondary Fuels | | 7,513 | Btu/kWh | | Btu/kWh |
| Levelized Capacity Factor / Preproduction(equiv | /alent months): | 85 | % | 1 | months |
| Capital Cost Year Dollars (Reference Year Dollars) | ars): | 1998 | (January) | | |
| Delivered Cost of Primary/Secondary Fuel | | 1.26 | \$/MBtu | | \$/MBtu |
| Design/Construction Period: | | 2.5 | years | | |
| Plant Startup Date (1st. Year Dollars): | | 2005 | (January) | | |
| Land Area/Unit Cost | | 300 | acre | \$1,500 | /acre |
| FINANCIAL CRITERIA | | | | | |
| Project Book Life: | | 20 | years | | |
| Book Salvage Value: | | | % | | |
| Project Tax Life: | | 20 | years | | |
| Tax Depreciation Method: | | Accel. based | d on ACRS C | Class | |
| Property Tax Rate: | | 1.0 | % per year | | |
| Insurance Tax Rate: | | 1.0 | % per year | | |
| Federal Income Tax Rate: | | 34.0 | % | | |
| State Income Tax Rate: | | 6.0 | % | | |
| Investment Tax Credit/% Eligible | | | % | | % |
| Economic Basis: | | 10th.Year | Constant Do | llars | |
| Capital Structure Common Equity Preferred Stock | - | % of Total 20 | | Cost(%) 16.5 | - |
| Debt Weighted Cost of Capital:(after tax) | | 80 | 6.2 | 5.8 % | |
| Escalation Rates | General Primary Fuel Secondary Fuel | | ife % per year % per year % per year | | 5 % per year % per year % per year |

Client: DEPARTMENT OF ENERGY 14-Aug-98 Report Date: Project: Market Based Advanced Coal Power Systems 11:00 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2005-80/20) 349.2 MW,net

Plant Size: Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| Acct | I | Equipment | Material | Labor Sales Bare Erecte | | | Rare Frected | Engig CM | Conting | encies | TOTAL PLANT COST | | |
|---------|---|-----------|----------|-------------------------|----------|-----|--------------|-----------|----------|----------|------------------|-------|--|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW | |
| 140. | item/bescription | 0031 | 0031 | Direct | mancot | IUA | 003t w | 11.0.4100 | 1100033 | TTOJCCE | " | Ψ/ΚΨ | |
| 1 | COAL & SORBENT HANDLING | 5,347 | 1,073 | 4,670 | 327 | | \$11,417 | 913 | | 2,466 | \$14,796 | 42 | |
| 2 | COAL & SORBENT PREP & FEED | 6,455 | 1,485 | 6,972 | 488 | | \$15,400 | 1,232 | 517 | 2,261 | \$19,410 | 56 | |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 5,483 | 2,655 | 4,284 | 300 | | \$12,722 | 1,018 | | 3,309 | \$17,049 | 49 | |
| 4 | GASIFIER & ACCESSORIES | | | | | | | | | | | | |
| | Gasifier & Auxiliaries(Destec) | 8,575 | | 8,734 | 611 | | \$17,921 | 1,434 | 1,792 | 2,115 | \$23,261 | 67 | |
| | High Temperature Cooling | 14,603 | | 14,880 | 1,042 | | \$30,525 | 2,442 | 3,052 | 3,602 | \$39,621 | 113 | |
| | ASU/Oxidant Compression | 45,518 | | w/equip. | | | \$45,518 | 3,641 | | 4,916 | \$54,075 | 155 | |
| 4.4-4.9 | Other Gasification Equipment | | 3,760 | 2,093 | 147 | | \$5,999 | 480 | | 1,700 | \$8,179 | 23 | |
| | SUBTOTAL 4 | 68,696 | 3,760 | 25,707 | 1,800 | | \$99,963 | 7,997 | 4,845 | 12,333 | \$125,137 | 358 | |
| 5 | HOT GAS CLEANUP & PIPING | 24,722 | 2,048 | 8,700 | 609 | | \$36,079 | 2,886 | 4,305 | 8,814 | \$52,084 | 149 | |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | | | 407 | | 445.004 | | | = 0.40 | 455 444 | 405 | |
| | Combustion Turbine Generator | 42,367 | 400 | 2,820 | 197 | | \$45,384 | 3,631 | 3,404 | 5,242 | \$57,660 | 165 | |
| 6.2-6.9 | Combustion Turbine Accessories | 42.267 | 136 | 157 | 11 | | \$305 | 24 | 2 40 4 | 99 | \$428 | 1 | |
| | SUBTOTAL 6 | 42,367 | 136 | 2,977 | 208 | | \$45,689 | 3,655 | 3,404 | 5,341 | \$58,088 | 166 | |
| 7 7 1 | HRSG, DUCTING & STACK Heat Recovery Steam Generator | 13.056 | | 1,877 | 131 | | \$15,065 | 1,205 | | 1,627 | \$17,897 | 51 | |
| | HRSG Accessories, Ductwork and Stack | 1,898 | 706 | 1,341 | 94 | | \$4,039 | 323 | | 605 | \$4,967 | 14 | |
| 7.27.5 | SUBTOTAL 7 | 14,955 | 706 | 3,217 | 225 | | \$19,103 | 1,528 | | 2,232 | \$22,864 | 65 | |
| 8 | STEAM TURBINE GENERATOR | | | | | | | | | | | | |
| | Steam TG & Accessories | 12,044 | | 1,984 | 139 | | \$14,168 | 1,133 | | 1,530 | \$16,831 | 48 | |
| 8.2-8.9 | Turbine Plant Auxiliaries and Steam Piping | | 160 | 2,887 | 202 | | \$8,513 | 681 | | 1,583 | \$10,777 | 31 | |
| | SUBTOTAL 8 | 17,308 | 160 | 4,871 | 341 | | \$22,680 | 1,814 | | 3,113 | \$27,608 | 79 | |
| 9 | COOLING WATER SYSTEM | 3,714 | 2,055 | 3,501 | 245 | | \$9,514 | 761 | | 1,846 | \$12,121 | 35 | |
| 10 | ASH/SPENT SORBENT HANDLING SYS | 3,463 | 642 | 2,949 | 206 | | \$7,261 | 581 | 494 | 967 | \$9,303 | 27 | |
| 11 | ACCESSORY ELECTRIC PLANT | 11,636 | 3,829 | 9,563 | 669 | | \$25,696 | 2,056 | | 4,571 | \$32,323 | 93 | |
| 12 | INSTRUMENTATION & CONTROL | 5,117 | 1,434 | 5,327 | 373 | | \$12,251 | 980 | | 2,056 | \$15,287 | 44 | |
| 13 | IMPROVEMENTS TO SITE | 1,831 | 1,053 | 3,667 | 257 | | \$6,807 | 545 | | 2,205 | \$9,557 | 27 | |
| 14 | BUILDINGS & STRUCTURES | | 4,241 | 5,471 | 383 | | \$10,096 | 808 | | 2,726 | \$13,629 | 39 | |
| | TOTAL COST | \$211,093 | \$25,277 | \$91,876 | \$6,431 | | \$334,677 | \$26,774 | \$13,564 | \$54,240 | \$429,256 | 1229 | |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98 11:00 AM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Destec (2005-80/20) 349.2 MW,net Case:

Plant Size: Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| | riant Size. | 0 -1 0.2 | ivivv ,riet | Louis | nate Type. | Conce | ptdai | | St Dase (Jail) | 1330 | (ΦΧ1000) | |
|-----|------------------------------------|---------------------|-------------|-----------|------------|-------|--------------|-----------|----------------|----------|-------------|-------|
| Acc | ct | Equipment | Material | Lak | oor | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
| No | o. Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | | | | | | | | | | | |
| 1 | 1.1 Coal Receive & Unload | 1,404 | | 773 | 54 | | \$2,231 | 178 | | 482 | \$2,891 | 8 |
| 1 | 1.2 Coal Stackout & Reclaim | 1,814 | | 495 | 35 | | \$2,345 | 188 | | 506 | \$3,038 | 9 |
| 1 | 1.3 Coal Conveyors & Yd Crush | 1,687 | | 490 | 34 | | \$2,211 | 177 | | 478 | \$2,866 | 8 |
| 1 | 1.4 Other Coal Handling | 441 | | 113 | 8 | | \$563 | 45 | | 122 | \$729 | 2 |
| 1 | 1.5 Sorbent Receive & Unload | | | | | | | | | | | |
| 1 | 1.6 Sorbent Stackout & Reclaim | | | | | | | | | | | |
| 1 | 1.7 Sorbent Conveyors | | | | | | | | | | | |
| | 1.8 Other Sorbent Handling | | | | | | | | | | | |
| 1 | 1.9 Coal & Sorbent Hnd.Foundations | | 1,073 | 2,798 | 196 | | \$4,067 | 325 | | 878 | \$5,271 | 15 |
| | SUBTOTAL 1. | \$5,347 | \$1,073 | \$4,670 | \$327 | | \$11,417 | \$913 | | \$2,466 | \$14,796 | 42 |
| 2 | COAL & SORBENT PREP & FEED | | | | | | | | | | | |
| 2 | 2.1 Coal Crushing & Drying | 895 | 140 | 336 | 23 | | \$1,394 | 112 | | 301 | \$1,806 | 5 |
| | 2.2 Prepared Coal Storage & Feed | 308 | 69 | 54 | 4 | | \$435 | 35 | | 94 | \$564 | 2 |
| 2 | 2.3 Slurry Prep & Feed | 4,991 | | 4,999 | 350 | | \$10,340 | 827 | 517 | 1,168 | \$12,853 | 37 |
| | 2.4 Misc.Coal Prep & Feed | 262 | 178 | 643 | 45 | | \$1,127 | 90 | | 243 | \$1,461 | 4 |
| | 2.5 Sorbent Prep Equipment | | | | | | | | | | | |
| | 2.6 Sorbent Storage & Feed | | | | | | | | | | | |
| | 2.7 Sorbent Injection System | | | | | | | | | | | |
| | 2.8 Booster Air Supply System | | | | | | | | | | | |
| 2 | 2.9 Coal & Sorbent Feed Foundation | | 1,098 | 940 | 66 | | \$2,104 | 168 | | 454 | \$2,726 | 8 |
| | SUBTOTAL 2. | \$6,455 | \$1,485 | \$6,972 | \$488 | | \$15,400 | \$1,232 | \$517 | \$2,261 | \$19,410 | 56 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | | | | | | | | | | | |
| | 3.1 FeedwaterSystem | 754 | 1,467 | 783 | 55 | | \$3,058 | 245 | | 661 | \$3,964 | 11 |
| | 3.2 Water Makeup & Pretreating | 376 | 40 | 216 | 15 | | \$646 | 52 | | 209 | \$907 | 3 |
| | 3.3 Other Feedwater Subsystems | 449 | 168 | 153 | 11 | | \$780 | 62 | | 168 | \$1,011 | 3 |
| | 3.4 Service Water Systems | 29 | 62 | 218 | 15 | | \$324 | 26 | | 105 | \$455 | 1 |
| | 3.5 Other Boiler Plant Systems | 1,229 | 496 | 1,243 | 87 | | \$3,054 | 244 | | 660 | \$3,958 | 11 |
| | 3.6 FO Supply Sys & Nat Gas | 94 | 178 | 336 | 23 | | \$632 | 51 | | 136 | \$818 | 2 |
| | 3.7 Waste Treatment Equipment | 747 | | 438 | 31 | | \$1,215 | 97 | | 394 | \$1,706 | 5 |
| 3 | 3.8 Misc. Power Plant Equipment | 1,806 | 244 | 900 | 63 | | \$3,013 | 241 | | 976 | \$4,230 | 12 |
| | SUBTOTAL 3. | \$5,483 | \$2,655 | \$4,284 | \$300 | | \$12,722 | \$1,018 | | \$3,309 | \$17,049 | 49 |
| 4 | GASIFIER & ACCESSORIES | | | | | | | | | | | |
| | 4.1 Gasifier & Auxiliaries(Destec) | 8,575 | | 8,734 | 611 | | \$17,921 | 1,434 | 1,792 | 2,115 | \$23,261 | 67 |
| | 4.2 High Temperature Cooling | 14,603 | | 14,880 | 1,042 | | \$30,525 | 2,442 | 3,052 | 3,602 | \$39,621 | 113 |
| | 4.3 ASU/Oxidant Compression | 45,518 | , | w/equip. | | | \$45,518 | 3,641 | | 4,916 | \$54,075 | 155 |
| | 4.4 Booster Air Compression | | | | | | | | | | | |
| | 4.5 Misc. Gasification Equipment | w/4.1&4.2 | | w/4.1&4.2 | | | | | | | | |
| | 4.6 Other Gasification Equipment | | 784 | 322 | 23 | | \$1,129 | 90 | | 122 | \$1,341 | 4 |
| | 4.8 Major Component Rigging | w/4.1&4.2 | | w/4.1&4.2 | | | | | | | | |
| 4 | 4.9 Gasification Foundations | | 2,976 | 1,771 | 124 | | \$4,871 | 390 | A. a | 1,578 | \$6,839 | 20 |
| | SUBTOTAL 4. | \$68,696 | \$3,760 | \$25,707 | \$1,800 | | \$99,963 | \$7,997 | \$4,845 | \$12,333 | \$125,137 | 358 |

Client: DEPARTMENT OF ENERGY

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

 Case:
 Destec (2005-80/20)

 Plant Size:
 349.2 MW,net

 Plant Size:
 349.2 MW, net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998 (\$x1000)

| | Equipment Material Labor | | Calas | Sales Bare Erected Eng'q CM Contingencies | | anaiaa | TOTAL PLANT COST | | | | | |
|------------|-----------------------------------|-------------------|------------------|---|----------------|--------------|------------------|-----------|---------|---------|---|--------|
| Acc No. | | Cost | Material Cost | Direct | or Indirect | Sales Tax | Cost \$ | H.O.& Fee | | | \$ | \$/kW |
| NO. | item/Description | Cost | Cost | Direct | indirect | ıax | Cost \$ | H.O.& Fee | Process | Project | • | \$/KVV |
| 5 | HOT GAS CLEANUP & PIPING | | | | | | | | | | | |
| 1 - | 1 Transport Reactor | 3.895 | | 2.095 | 147 | | \$6.136 | 491 | 920 | 1.509 | \$9.057 | 26 |
| | 2 Sulfur Recovery (Sulfuric Acid) | 12,541 | | 3,969 | 278 | | \$16,787 | 1,343 | 839 | 3,794 | \$22,764 | 65 |
| | .3 Chloride Guard | 2,995 | | 711 | 50 | | \$3,756 | 300 | 939 | 999 | \$5,995 | 17 |
| 1 - | 4 Particulate Removal | 4,177 | | 515 | 36 | | \$4,728 | 378 | 1,182 | 1,258 | \$7,546 | 22 |
| | 5 Blowback Gas Systems | 1,113 | 362 | 206 | 14 | | \$1,696 | 136 | 424 | 451 | \$2,706 | |
| | 6 Fuel Gas Piping | 1,110 | 821 | 624 | 44 | | \$1,488 | 119 | 727 | 321 | \$1,929 | 6 |
| 1 | 9 HGCU Foundations | | 865 | 581 | 41 | | \$1,487 | 119 | | 482 | \$2,088 | 6 |
| " | SUBTOTAL 5. | \$24,722 | \$2,048 | \$8,700 | \$609 | | \$36,079 | \$2,886 | \$4,305 | \$8,814 | \$52,084 | |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | ψ <u>2</u> ,0-10 | ψο,,, σο | 4000 | | 400,010 | Ψ2,000 | ψ-1,000 | ψ0,014 | 402,004 | |
| | 1 Combustion Turbine Generator | 42,367 | | 2,820 | 197 | | \$45,384 | 3,631 | 3,404 | 5,242 | \$57,660 | 165 |
| | 2 Combustion Turbine Accessories | w/6.1 | | w/6.1 | 107 | | ψ10,001 | 0,001 | 0,101 | 0,212 | φο1,000 | 100 |
| | 3 Compressed Air Piping | 1170.1 | | **/ 0. 1 | | | | | | | | |
| | 9 Combustion Turbine Foundations | | 136 | 157 | 11 | | \$305 | 24 | | 99 | \$428 | 1 |
| " | SUBTOTAL 6. | \$42.367 | \$136 | \$2,977 | \$208 | | \$45,689 | \$3.655 | \$3,404 | \$5,341 | \$58,088 | 166 |
| 7 | HRSG, DUCTING & STACK | 4 1, 5 5 1 | **** | - , | 4 | | V 10,000 | 45,555 | 40,101 | *-,- | *************************************** | |
| 7 | 1 Heat Recovery Steam Generator | 13,056 | | 1,877 | 131 | | \$15,065 | 1,205 | | 1,627 | \$17,897 | 51 |
| | 2 HRSG Accessories | | | ,- | | | , ,,,,,,,,, | , | | ,- | , | - |
| 7 | .3 Ductwork | | 613 | 526 | 37 | | \$1,176 | 94 | | 254 | \$1,525 | 4 |
| 7 | 4 Stack | 1,898 | | 721 | 50 | | \$2,669 | 214 | | 288 | \$3,171 | 9 |
| 7 | 9 HRSG, Duct & Stack Foundations | · · | 93 | 93 | 7 | | \$193 | 15 | | 63 | \$271 | 1 |
| | SUBTOTAL 7. | \$14,955 | \$706 | \$3,217 | \$225 | | \$19,103 | \$1,528 | | \$2,232 | \$22,864 | 65 |
| 8 | STEAM TURBINE GENERATOR | ' ' | | | | | . , | . , | | | , , | |
| 8 | 1 Steam TG & Accessories | 12,044 | | 1,984 | 139 | | \$14,168 | 1,133 | | 1,530 | \$16,831 | 48 |
| 8 | 2 Turbine Plant Auxiliaries | 83 | | 193 | 13 | | \$289 | 23 | | 31 | \$343 | 1 |
| 8 | 3 Condenser & Auxiliaries | 2,141 | | 592 | 41 | | \$2,775 | 222 | | 300 | \$3,296 | 9 |
| 8 | 4 Steam Piping | 3,039 | | 1,601 | 112 | | \$4,753 | 380 | | 1,027 | \$6,160 | 18 |
| 8 | 9 TG Foundations | | 160 | 501 | 35 | | \$696 | 56 | | 225 | \$977 | 3 |
| | SUBTOTAL 8. | \$17,308 | \$160 | \$4,871 | \$341 | | \$22,680 | \$1,814 | | \$3,113 | \$27,608 | 79 |
| 9 | COOLING WATER SYSTEM | | | | | | | | | | | |
| 9 | 1 Cooling Towers | 2,849 | | 632 | 44 | | \$3,526 | 282 | | 381 | \$4,189 | |
| 9 | 2 Circulating Water Pumps | 417 | | 40 | 3 | | \$459 | 37 | | 50 | \$546 | |
| | 3 Circ.Water System Auxiliaries | 51 | | 7 | 1 | | \$59 | 5 | | 6 | \$70 | |
| | 4 Circ.Water Piping | | 988 | 1,110 | 78 | | \$2,176 | 174 | | 470 | \$2,820 | |
| | 5 Make-up Water System | 113 | | 170 | 12 | | \$295 | 24 | | 64 | \$382 | |
| | 6 Component Cooling Water Sys | 283 | 339 | 252 | 18 | | \$892 | 71 | | 193 | \$1,156 | |
| 9 | 9 Circ.Water System Foundations | | 727 | 1,289 | 90 | | \$2,107 | 169 | | 683 | \$2,958 | 8 |
| | SUBTOTAL 9. | \$3,714 | \$2,055 | \$3,501 | \$245 | | \$9,514 | \$761 | | \$1,846 | \$12,121 | 35 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | | | | | | | | | | | |
| | 1 Slag Dewatering & Cooling | 2,392 | | 2,385 | 167 | | \$4,944 | 395 | 494 | 583 | \$6,417 | 18 |
| | 2 Gasifier Ash Depressurization | | | | | | | | | | | |
| | 3 Cleanup Ash Depressurization | | | | | | | | | | | |
| | 4 High Temperature Ash Piping | | | | | | | | | | | |
| | 5 Other Ash Recovery Equipment | | | | | | | | | | | |
| | 6 Ash Storage Silos | 245 | | 269 | 19 | | \$533 | 43 | | 86 | \$662 | |
| | 7 Ash Transport & Feed Equipment | 319 | | 80 | 6 | | \$405 | 32 | | 66 | \$503 | |
| | 8 Misc. Ash Handling Equipment | 507 | 621 | 188 | 13 | | \$1,329 | 106 | | 215 | \$1,651 | 5 |
| 10 | 9 Ash/Spent Sorbent Foundation | | 21 | 27 | 2 | | \$50 | 4 | | 16 | \$71 | 0 |
| | SUBTOTAL 10. | \$3,463 | \$642 | \$2,949 | \$206 | | \$7,261 | \$581 | \$494 | \$967 | \$9,303 | 27 |

14-Aug-98

11:00 AM

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98
Project: Market Based Advanced Coal Power Systems 11:00 AM
11:00 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2005-80/20)

 Plant Size:
 349.2 MW net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998
 (\$x1000)

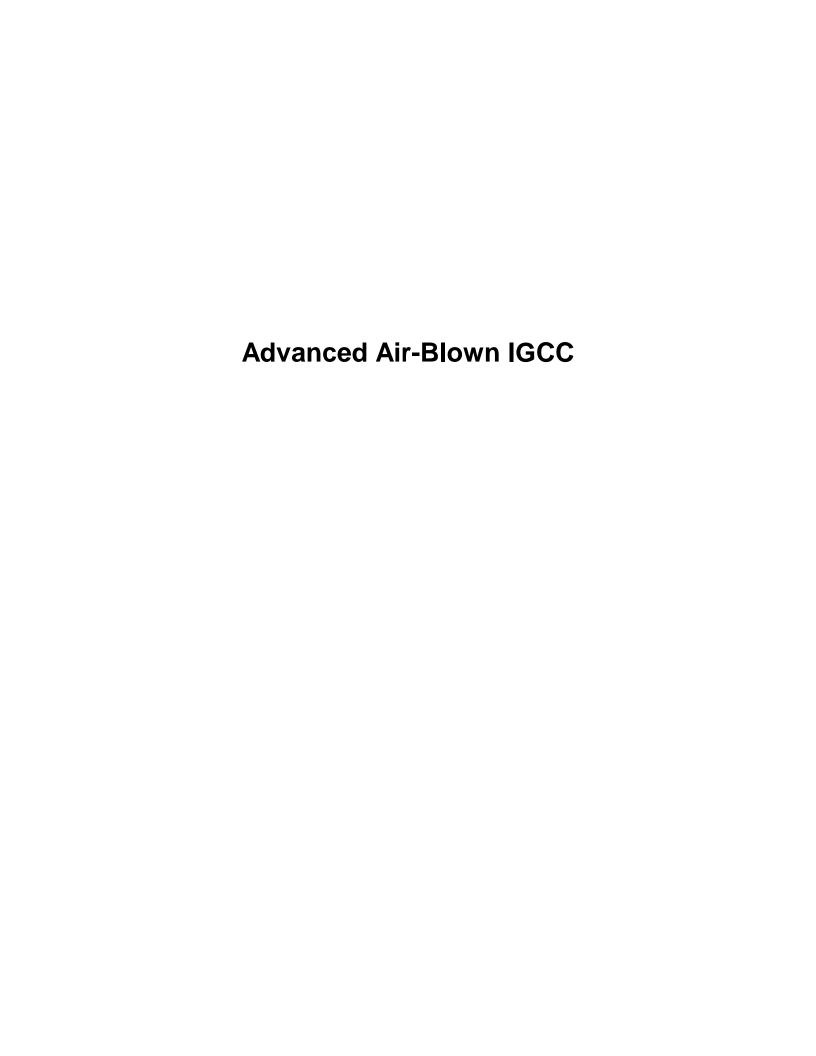
| | | | , | | iato Typo. | | F 14-4-1 | | , | | (4 | |
|------|--------------------------------|------------------|----------|-----------------|------------|-------|--------------------------------|--|-------------------------|-----------------|------------------|-------------|
| Acct | | Equipment | Material | Lab | or | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | | | | - | | |
| 11.1 | Generator Equipment | 1,376 | | 273 | 19 | | \$1,669 | 134 | | 180 | \$1,983 | 6 |
| 11.2 | Station Service Equipment | 3,552 | | 293 | 21 | | \$3,866 | 309 | | 418 | \$4,593 | 13 |
| 11.3 | Switchgear & Motor Control | 2,832 | | 471 | 33 | | \$3,336 | 267 | | 540 | \$4,144 | 12 |
| 11.4 | Conduit & Cable Tray | | 1,708 | 5,358 | 375 | | \$7,441 | 595 | | 1,607 | \$9,644 | 28 |
| 11.5 | Wire & Cable | | 1,833 | 1,831 | 128 | | \$3,792 | 303 | | 819 | \$4,915 | 14 |
| 11.6 | Protective Equipment | | 131 | 437 | 31 | | \$599 | 48 | | 97 | \$744 | 2 |
| 11.7 | Standby Equipment | 639 | | 14 | 1 | | \$655 | 52 | | 106 | \$813 | 2 |
| 11.8 | Main Power Transformers | 3,235 | | 454 | 32 | | \$3,720 | 298 | | 603 | \$4,621 | 13 |
| 11.9 | Electrical Foundations | | 156 | 431 | 30 | | \$618 | 49 | | 200 | \$868 | 2 |
| | SUBTOTAL 11. | \$11,636 | \$3,829 | \$9,563 | \$669 | | \$25,696 | \$2,056 | | \$4,571 | \$32,323 | 93 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| 12.1 | IGCC Control Equipment | | | | | | | | | | | |
| 12.2 | Combustion Turbine Control | | | | | | | | | | | |
| 12.3 | Steam Turbine Control | | | | | | | | | | | |
| 12.4 | Other Major Component Control | 480 | | 293 | 21 | | \$794 | 64 | | 129 | \$987 | 3 |
| 12.5 | Signal Processing Equipment | W/12.7 | | w/12.7 | | | | | | | | |
| 12.6 | Control Boards, Panels & Racks | 115 | | 68 | 5 | | \$188 | 15 | | 41 | \$243 | 1 |
| 12.7 | Computer & Accessories | 3,676 | | 135 | 9 | | \$3,820 | 306 | | 413 | | 13 |
| 12.8 | Instrument Wiring & Tubing | | 1,434 | 4,456 | 312 | | \$6,202 | 496 | | 1,340 | \$8,037 | 23 |
| 12.9 | Other I & C Equipment | 846 | | 376 | 26 | | \$1,248 | 100 | | 135 | \$1,482 | 4 |
| | SUBTOTAL 12. | \$5,117 | \$1,434 | \$5,327 | \$373 | | \$12,251 | \$980 | | \$2,056 | \$15,287 | 44 |
| 13 | IMPROVEMENTS TO SITE | | | | | | | | | | | |
| 13.1 | Site Preparation | | 31 | 612 | 43 | | \$685 | 55 | | 222 | \$962 | 3 |
| 13.2 | Site Improvements | | 1,022 | 1,261 | 88 | | \$2,371 | 190 | | 768 | \$3,329 | 10 |
| 13.3 | Site Facilities | 1,831 | | 1,794 | 126 | | \$3,751 | 300 | | 1,215 | \$5,266 | 15 |
| | SUBTOTAL 13. | \$1,831 | \$1,053 | \$3,667 | \$257 | | \$6,807 | \$545 | | \$2,205 | \$9,557 | 27 |
| 14 | BUILDINGS & STRUCTURES | | | | | | | | | | | |
| | Combustion Turbine Area | | 214 | 135 | 9 | | \$359 | 29 | | 97 | \$485 | 1 |
| 14.2 | Steam Turbine Building | | 1,757 | 2,788 | 195 | | \$4,740 | 379 | | 1,280 | \$6,399 | 18 |
| | Administration Building | | 422 | 341 | 24 | | \$786 | 63 | | 212 | | 3 |
| 14.4 | Circulation Water Pumphouse | | 83 | 49 | 3 | | \$135 | 11 | | 37 | \$183 | 1 |
| | Water Treatment Buildings | | 526 | 571 | 40 | | \$1,137 | 91 | | 307 | \$1,535 | 4 |
| 14.6 | Machine Shop | | 216 | 164 | 12 | | \$392 | 31 | | 106 | \$529 | 2 |
| | Warehouse | | 348 | 250 | 18 | | \$616 | 49 | | 166 | | 2 2 2 |
| | Other Buildings & Structures | | 209 | 181 | 13 | | \$402 | 32 | | 109 | | |
| 14.9 | Waste Treating Building & Str. | | 466 | 993 | 69 | | \$1,528 | 122 | | 413 | \$2,063 | 6 |
| | SUBTOTAL 14. | | \$4,241 | \$5,471 | \$383 | | \$10,096 | \$808 | | \$2,726 | \$13,629 | 39 |
| | TOTAL 000T | * 044.000 | A05.077 | * 04.070 | 00.404 | | ****************************** | ************************************** | * 40 F 04 | \$54.040 | * 400.050 | 4000 |
| | TOTAL COST | \$211,093 | \$25,277 | \$91,876 | \$6,431 | | \$334,677 | \$26,774 | \$13,564 | \$54,240 | \$429,256 | 1229 |

| CONTINGENCY Destec (2005-80/20) | FACTORS | |
|--|--------------------------------|-------------------------------|
| Item/Description | Contingency <u>%Process</u> | Factors(%) <u>%Project</u> |
| COAL & SORBENT HANDLING | | 20.0 |
| COAL & SORBENT PREP & FEED | 3.4 | 13.2 |
| FEEDWATER & MISC. BOP SYSTEMS | | 24.1 |
| GASIFIER & ACCESSORIES | | |
| Gasifier & Auxiliaries(Destec) | 10.0 | 10.0 |
| High Temperature Cooling | 10.0 | 10.0 |
| ASU/Oxidant Compression | | 10.0 |
| Other Gasification Equipment | | 26.2 |
| HOT GAS CLEANUP & PIPING | 11.9 | 20.4 |
| COMBUSTION TURBINE/ACCESSORIES | | |
| Combustion Turbine Generator | 7.5 | 10.0 |
| Combustion Turbine Accessories | | 30.0 |
| HRSG, DUCTING & STACK | | |
| Heat Recovery Steam Generator | | 10.0 |
| HRSG Accessories, Ductwork and Stack | | 13.9 |
| STEAM TURBINE GENERATOR | | |
| Steam TG & Accessories | | 10.0 |
| Turbine Plant Auxiliaries and Steam Piping | | 17.2 |
| COOLING WATER SYSTEM | | 18.0 |
| ASH/SPENT SORBENT HANDLING SYS | 6.8 | 11.6 |
| ACCESSORY ELECTRIC PLANT | | 16.5 |
| INSTRUMENTATION & CONTROL | | 15.5 |
| IMPROVEMENTS TO SITE | | 30.0 |
| BUILDINGS & STRUCTURES | | 25.0 |
| | | |

| OPERATING LABOR R | OPERATING LABOR REQUIREMENTS | | | | | | | | | | |
|--|------------------------------|--------------|--|--|--|--|--|--|--|--|--|
| Destec (2005-80/20) | | | | | | | | | | | |
| Operating Labor Rate(base): | 25.89 \$/hour | | | | | | | | | | |
| Operating Labor Burden: | 30.00 % of base | | | | | | | | | | |
| Labor O-H Charge Rate: | 25.00 % of lab | oor | | | | | | | | | |
| Operating Labor Requirements(O.J.)per Shift: | | Total | | | | | | | | | |
| Category | 1 unit/mod. | <u>Plant</u> | | | | | | | | | |
| Skilled Operator | 2.0 | 2.0 | | | | | | | | | |
| Operator | 10.0 | 10.0 | | | | | | | | | |
| Foreman | 1.0 | 1.0 | | | | | | | | | |
| Lab Tech's, etc. | <u>3.0</u> | <u>3.0</u> | | | | | | | | | |
| TOTAL-O.J.'s | 16.0 | 16.0 | | | | | | | | | |

| CONSUMABLES, BY-PRODUCTS | & FUELS DATA | | |
|---|----------------|-------|--------|
| Destec (2005-80/20) | | | |
| | Consum | ption | Unit |
| Item/Description | <u>Initial</u> | /Day | _Cost_ |
| Water(/1000 gallons) | | 2,545 | 0.80 |
| Chemicals | | | |
| MU & WT Chem.(lbs) | 227,461 | 7,582 | 0.16 |
| Limestone (ton) | | | 16.25 |
| Z Sorb (ton)** | 21,600 | 720.0 | 3.50 |
| Nahcolite(ton) | 75 | 2.5 | 270.00 |
| Other Supplemental Fuel(MBtu) Gases,N2 etc.(/100scf) L.P. Steam(/1000 pounds) | | | 1.50 |
| Waste Disposal | | | |
| Sludge(ton) Slag(ton) | | 269 | 10.00 |
| By-products & Emissions Sulfuric Acid(pounds) | | 206 | 68.00 |
| Fuel(ton) | | 2,699 | 29.29 |

| MAINTENANCE FACTORS Destec (2005-80/20) | |
|--|------------------|
| Item/Description | Maintenance % |
| COAL & SORBENT HANDLING | 2.0 |
| COAL & SORBENT PREP & FEED | 2.9 |
| FEEDWATER & MISC. BOP SYSTEMS | 2.0 |
| GASIFIER & ACCESSORIES | |
| Gasifier & Auxiliaries(Destec) | 5.0 |
| High Temperature Cooling | 4.5 |
| ASU/Oxidant Compression | 4.0 |
| Other Gasification Equipment | 0.8 |
| HOT GAS CLEANUP & PIPING | 4.5 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | 10.3 |
| Combustion Turbine Accessories | 0.5 |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | 2.0 |
| HRSG Accessories, Ductwork and Stack | 1.5 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 1.5 |
| Turbine Plant Auxiliaries and Steam Piping | 1.7 |
| COOLING WATER SYSTEM | 1.3 |
| ASH/SPENT SORBENT HANDLING SYS | 3.0 |
| ACCESSORY ELECTRIC PLANT | 1.5 |
| INSTRUMENTATION & CONTROL | 1.6 |
| IMPROVEMENTS TO SITE | 1.2 |
| BUILDINGS & STRUCTURES | 1.4 |
| | |



| CAPITAL INVESTMENT & | REVENUE REQUIREME | NT SUMMAR | RY | |
|---|-------------------------|---------------|--------------|------------|
| TITLE/DEFINITION | | | | |
| Case: | Transport Reactor (2010 |) | | |
| Plant Size: | 398.1 (MW,net) | HeatRate: | 6,870 | (Btu/kWh) |
| Primary/Secondary Fuel(type): | Illnois #6 | Cost: | | (\$/MMBtu) |
| Design/Construction: | 3 (years) | BookLife: | 20 | (years) |
| TPC(Plant Cost) Year: | 1998 (Jan.) | TPI Year: | 2005 | (Jan.) |
| Capacity Factor: | 85 (%) | | | |
| CAPITAL INVESTMENT | | \$x1000 | | \$/kW |
| Process Capital & Facilities | | 281,703 | | 707.6 |
| Engineering(incl.C.M.,H.O.& Fee) | | 22,536 | | 56.6 |
| Process Contingency | | 21,471 | | 53.9 |
| Project Contingency | | 56,850 | | 142.8 |
| TOTAL PLANT COST(TPC) | | ¢292 550 | | 960.9 |
| TOTAL PLANT COST(TPC) TOTAL CASH EXPENDED | ¢202 FF | \$382,559 | | 960.9 |
| AFDC | \$382,55 \$30,10 | | | |
| | \$30,10 | | 1026 E | |
| TOTAL PLANT INVESTMENT(TPI) | | \$412,665 | | 1036.5 |
| Royalty Allowance | | | | |
| Preproduction Costs | | 10,310 | | 25.9 |
| Inventory Capital | | 3,269 | | 8.2 |
| Initial Catalyst & Chemicals(w/equip.) | | 450 | | 4.4 |
| Land Cost | | 450 | | 1.1 |
| TOTAL CAPITAL REQUIREMENT(TCR |) | \$426,694 | | 1071.8 |
| OPERATING & MAINTENANCE COSTS (1998 D | ollars) | \$x1000 | | \$/kW-yr |
| Operating Labor | - | 4,717 | | 11.8 |
| Maintenance Labor | | 3,208 | | 8.1 |
| Maintenance Material | | 4,812 | | 12.1 |
| Administrative & Support Labor | | 1,981 | | 5.0 |
| TOTAL OPERATION & MAINTENANCE | . | \$14,719 | | 37.0 |
| FIXED O & M | | | 31.42 | \$/kW-yr |
| VARIABLE O & M | | | 0.07 | ¢/kWh |
| CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars) | \$x1000 | | ¢/kWh |
| Water | | 525 | | 0.02 |
| Chemicals | | 1,285 | | 0.04 |
| Other Consumables | | | | |
| Waste Disposal | | 846_ | | 0.03 |
| TOTAL CONSUMABLE OPERATING C | OSTS | \$2,656 | | 0.09 |
| BY-PRODUCT CREDITS (1998 Dollars) | | (\$4,534) | | -0.15 |
| FUEL COST (1998 Dollars) | | \$25,562 | | 0.86 |
| | 1st Year (2005 \$) | <u>Leveli</u> | ized (10th.) | 'ear \$) |
| PRODUCTION COST SUMMARY | ¢/kW | | ¢/kWh | |
| Fixed O & M | 31.4/kW-yr 0.4 | , | 0.42 | |
| Variable O & M | 0.0 | | 0.07 | |
| Consumables | 0.0 | | 0.09 | |
| By-product Credit | -0.1 | | -0.15 | |
| Fuel TOTAL PRODUCTION COST | <u> 0.79</u> | | 0.74 1.18 | |
| LEVELIZED CARRYING CHARGES(Capital) | 1.2 | 144.7/kW-yr | 1.94 | |
| , , , | | ,, | | |
| LEVELIZED (10th. Year) BUSBAR COST OF PO | WER | | 3.12 | |

| ESTIMATE BASIS/FINANCIAL CRIT | FRIA for REVENUE REQUIR | REMENT CALCULATIONS |
|--|-------------------------|--|
| GENERAL DATA/CHARACTERISTICS | ENIA IOI NEVENOE NEGOII | CLINENT CALCOLATIONS |
| Case Title: | Transport R | teactor (2010) |
| Unit Size:/Plant Size: | · | MW,net 398.1 MWe |
| Location: | Middletown, | USA |
| Fuel: Primary/Secondary | Illnois #6 | |
| Energy From Primary/Secondary Fuels | | Btu/kWh Btu/kWh |
| Levelized Capacity Factor / Preproduction(equiv | valent months): 85 | % 1 months |
| Capital Cost Year Dollars (Reference Year Dollars) | • | (January) |
| Delivered Cost of Primary/Secondary Fuel | • | \$/MBtu \$/MBtu |
| Design/Construction Period: | 3 | years |
| Plant Startup Date (1st. Year Dollars): | | (January) |
| Land Area/Unit Cost | 300 | acre \$1,500 /acre |
| FINANCIAL CRITERIA | | |
| Project Book Life: | 20 | years |
| Book Salvage Value: | | % |
| Project Tax Life: | 20 | years |
| Tax Depreciation Method: | Accel. base | d on ACRS Class |
| Property Tax Rate: | 1.0 | % per year |
| Insurance Tax Rate: | 1.0 | % per year |
| Federal Income Tax Rate: | 34.0 | % |
| State Income Tax Rate: | 6.0 | % |
| Investment Tax Credit/% Eligible | | % % |
| Economic Basis: | 10th.Year | Constant Dollars |
| Capital Structure Common Equity Preferred Stock | <u>% of Total</u> 20 | |
| Debt Weighted Cost of Capital:(after tax) | 80 | 5.8 6.2 % |
| Escalation Rates | | ife 1998 to 2005 % per year % per year % per year -1.36 % per year % per year 0.041 % per year |

 Client:
 DEPARTMENT OF ENERGY
 Report Date:
 14-Aug-98

 Project:
 Market Based Advanced Coal Power Systems
 08:50 AM

TOTAL PLANT COST SUMMARY

Case: Transport Reactor (2010)
Plant Size: 398.1 MW,net

Plant Size: 398.1 MW,net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| | | 230.1 WWY, net Estimate Type. Conceptual | | | | | | Cost base (bally 1330 (\$\pi\1000) | | | | |
|---------|--|--|----------|----------|----------|-------|--------------|------------------------------------|----------|----------|-------------|-------|
| Acct | | Equipment | Material | Lak | | Sales | Bare Erected | | Conting | | TOTAL PLANT | |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | 5,486 | 1,737 | 4,365 | 306 | | \$11,895 | 952 | | 2,569 | \$15,416 | 39 |
| 2 | COAL & SORBENT PREP & FEED | 5,568 | 775 | 3,580 | 251 | | \$10,173 | 814 | 343 | 2,266 | \$13,596 | 34 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 5,332 | 2,747 | 4,131 | 289 | | \$12,500 | 1,000 | | 3,236 | \$16,736 | 42 |
| 4 | GASIFIER & ACCESSORIES | | | | | | | | | | | |
| 4.1 | Gasifier & Auxiliaries | 14,365 | | 7,725 | 541 | | \$22,631 | 1,810 | 5,658 | 6,020 | \$36,118 | 91 |
| 4.2 | High Temperature Cooling | 4,394 | | 2,363 | 165 | | \$6,923 | 554 | 1,038 | 1,703 | \$10,218 | 26 |
| 4.3 | Recycle Gas System | 1,799 | | 1,342 | 94 | | \$3,235 | 259 | 485 | 796 | \$4,775 | 12 |
| | Other Gasification Equipment | 5,936 | 3,684 | 3,555 | 249 | | \$13,424 | 1,074 | 1,128 | 3,662 | | |
| | SUBTOTAL 4 | 26,494 | 3,684 | 14,985 | 1,049 | | \$46,212 | 3,697 | 8,310 | 12,181 | \$70,400 | |
| 5 | HOT GAS CLEANUP & PIPING | 33,305 | 4,211 | 12,718 | 890 | | \$51,124 | 4,090 | 9,044 | 12,921 | \$77,179 | 194 |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | | | | | | | | | | |
| 6.1 | Combustion Turbine Generator | 43,435 | | 3,306 | 231 | | \$46,973 | 3,758 | 3,523 | 5,425 | | |
| 6.2-6.9 | Combustion Turbine Accessories | | 148 | 170 | 12 | | \$330 | 26 | | 107 | \$463 | |
| | SUBTOTAL 6 | 43,435 | 148 | 3,477 | 243 | | \$47,303 | 3,784 | 3,523 | 5,532 | \$60,143 | 151 |
| | HRSG, DUCTING & STACK | | | | | | | | | | | |
| | Heat Recovery Steam Generator | 12,666 | | 1,821 | 127 | | \$14,614 | 1,169 | | 1,578 | | |
| 7.2-7.9 | HRSG Accessories, Ductwork and Stack | 1,876 | 698 | 1,325 | 93 | | \$3,993 | 319 | | 598 | | |
| | SUBTOTAL 7 | 14,543 | 698 | 3,146 | 220 | | \$18,607 | 1,489 | | 2,176 | \$22,272 | 56 |
| 8 | STEAM TURBINE GENERATOR | | | | | | | | | | | |
| | Steam TG & Accessories | 10,806 | | 1,978 | 138 | | \$12,922 | 1,034 | | 1,396 | | 39 |
| 8.2-8.9 | Turbine Plant Auxiliaries and Steam Piping | | 160 | 2,882 | 202 | | \$8,500 | 680 | | 1,581 | \$10,761 | 27 |
| | SUBTOTAL 8 | 16,061 | 160 | 4,860 | 340 | | \$21,422 | 1,714 | | 2,976 | \$26,112 | 66 |
| 9 | COOLING WATER SYSTEM | 3,713 | 2,057 | 3,500 | 245 | | \$9,515 | 761 | | 1,846 | \$12,123 | 30 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | 3,630 | 798 | 1,472 | 103 | | \$6,003 | 480 | 252 | 1,019 | \$7,754 | 19 |
| 11 | ACCESSORY ELECTRIC PLANT | 8,939 | 2,252 | 5,834 | 408 | | \$17,434 | 1,395 | | 3,063 | \$21,892 | 55 |
| 12 | INSTRUMENTATION & CONTROL | 5,222 | 1,463 | 5,436 | 380 | | \$12,501 | 1,000 | | 2,098 | \$15,599 | 39 |
| 13 | IMPROVEMENTS TO SITE | 1,848 | 1,063 | 3,701 | 259 | | \$6,872 | 550 | | 2,226 | \$9,648 | 24 |
| 14 | BUILDINGS & STRUCTURES | | 4,264 | 5,493 | 384 | | \$10,141 | 811 | | 2,738 | \$13,691 | 34 |
| | TOTAL COST | \$173,578 | \$26,057 | \$76,699 | \$5,369 | | \$281,703 | \$22,536 | \$21,471 | \$56,850 | \$382,559 | 961 |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98 08:50 AM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Transport Reactor (2010) 398.1 MW,net Case:

Plant Size: Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| Acct | 1 | Equipment | Material | Lat | nor. | Calas | Bare Erected | Engla CM | Contino | onoios | TOTAL PLANT | COST |
|------|--|--------------------|----------|----------------------|--------------------|-------|---------------------|----------------|------------------|----------|----------------|-------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | Cost | Cost | Direct | manect | Iax | Cost \$ | π.σ.α ι ее | Fiocess | riojeci | 4 | Ψ/KVV |
| 1 ' | Coal Receive & Unload | 1.441 | | 793 | 56 | | \$2,289 | 183 | | 494 | \$2.967 | 7 |
| | Coal Stackout & Reclaim | 1,862 | | 508 | 36 | | \$2,406 | 192 | | 520 | \$3,118 | 8 |
| | Coal Conveyors & Yd Crush | 1,731 | | 503 | 35 | | \$2,269 | 182 | | 490 | \$2,941 | 7 |
| | Other Coal Handling | 453 | | 116 | 8 | | \$577 | 46 | | 125 | \$748 | 2 |
| 1.5 | | 100 | | 110 | Ü | | ψο// | 10 | | 120 | Ψίπο | - |
| 1 | Sorbent Stackout, Storage & Reclaim | | | | | | | | | | | |
| | Sorbent Conveyors | | | | | | | | | | | |
| | Other Sorbent Handling | | | | | | | | | | | |
| | Coal & Sorbent Hnd.Foundations | | 1,737 | 2.445 | 171 | | \$4.354 | 348 | | 940 | \$5.642 | 14 |
| | SUBTOTAL 1. | \$5,486 | \$1,737 | \$4,365 | \$306 | | \$11,895 | \$952 | | \$2,569 | \$15,416 | 39 |
| 2 | COAL & SORBENT PREP & FEED | . , | | . , | • | | . , | | | | | |
| 2.1 | Coal Crushing & Drying | 741 | 116 | 278 | 19 | | \$1,154 | 92 | | 249 | \$1,496 | 4 |
| 2.2 | Prepared Coal Storage & Feed | 255 | 57 | 45 | 3 | | \$360 | 29 | | 78 | \$467 | 1 |
| 2.3 | Coal & Sorbent Feed System | 4,356 | | 2,336 | 163 | | \$6,855 | 548 | 343 | 1,549 | \$9,295 | 23 |
| 2.4 | Misc.Coal Prep & Feed | 217 | 148 | 532 | 37 | | \$933 | 75 | | 202 | \$1,210 | 3 |
| 2.5 | Sorbent Prep Equipment | | | | | | | | | | | |
| 2.6 | Sorbent Storage & Feed | | | | | | | | | | | |
| 2.7 | | | | | | | | | | | | |
| 2.8 | | | | | | | | | | | | |
| 2.9 | Coal & Sorbent Feed Foundation | | 455 | 389 | 27 | | \$871 | 70 | | 188 | \$1,129 | 3 |
| | SUBTOTAL 2. | \$5,568 | \$775 | \$3,580 | \$251 | | \$10,173 | \$814 | \$343 | \$2,266 | \$13,596 | 34 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | | | | | | | | | | | |
| | FeedwaterSystem | 828 | 1,611 | 860 | 60 | | \$3,359 | 269 | | 726 | \$4,354 | 11 |
| | Water Makeup & Pretreating | 330 | 35 | 189 | 13 | | \$567 | 45 | | 184 | \$796 | 2 |
| | Other Feedwater Subsystems | 493 | 184 | 168 | 12 | | \$857 | 69 | | 185 | \$1,110 | 3 |
| | Service Water Systems | 25 | 54 | 191 | 13 | | \$284 | 23 | | 92 | \$399 | 1 |
| | Other Boiler Plant Systems | 1,078 | 435 | 1,090 | 76 | | \$2,679 | 214 | | 579 | \$3,472 | 9 |
| | FO Supply Sys & Nat Gas | 95 | 180 | 340 | 24 | | \$639 | 51 | | 138 | \$828 | 2 |
| | Waste Treatment Equipment | 655 | 0.47 | 384 | 27 | | \$1,066 | 85 | | 345 | \$1,497 | 4 |
| 3.8 | Misc. Power Plant Equipment | 1,827 | 247 | 911 | 64 | | \$3,048 | 244 | | 988 | \$4,280 | 11 |
| ١. | SUBTOTAL 3. | \$5,332 | \$2,747 | \$4,131 | \$289 | | \$12,500 | \$1,000 | | \$3,236 | \$16,736 | 42 |
| 4 | GASIFIER & ACCESSORIES | 44.005 | | 7 705 | 544 | | #00.004 | 4 040 | F 050 | 0.000 | 000 440 | 0.4 |
| 1 | Gasifier & Auxiliaries | 14,365 | | 7,725 | 541 | | \$22,631 | 1,810 | 5,658 | 6,020 | \$36,118 | 91 |
| | High Temperature Cooling | 4,394 | | 2,363 | 165 | | \$6,923 | 554 | 1,038 | 1,703 | \$10,218 | 26 |
| | Recycle Gas System | 1,799 | | 1,342 | 94 104 | | \$3,235 | 259 | 485 | 796 | \$4,775 | 12 |
| | Booster Air Compression Misc. Gasification Equipment | 5,936 w/4.1&4.2 | | 1,482 w/4.1&4.2 | 104 | | \$7,522 | 602 | 1,128 | 1,850 | \$11,102 | 28 |
| | • • | W/4.104.2 | 645 | w/4.1&4.2 265 | 19 | | \$929 | 74 | | 201 | \$1,204 | 3 |
| 4.6 | | w/4.1&4.2 | | ∠05 w/4.1&4.2 | 19 | | \$929 | /4 | | 201 | \$1,204 | 3 |
| | Major Component Rigging Gasification Foundations | W/4.104.2 | 3,039 | 1.808 | 127 | | \$4,973 | 398 | | 1,611 | \$6,982 | 18 |
| 4.9 | SUBTOTAL 4. | \$26,494 | \$3,684 | \$14,985 | \$1,049 | | \$4,973 \$46.212 | \$3,697 | \$8,310 | \$12,181 | \$70,400 | |
| | SUBTUTAL 4. | ⊅∠∪,494 | ψ3,004 | φ14, 3 03 | φ1, 049 | | Ψ40,212 | Ψ3,09 1 | ФО, Э I U | Φ12,101 | ⊅10,400 | |

Client: DEPARTMENT OF ENERGY

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Case: Transport Reactor (2010)
Plant Size: 398.1 MW,net

Plant Size: 398.1 MW,net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| 5.1 Trains 5.2 Sulf 5.3 Child 5.4 Par 5.5 Blow 5.6 Fue 5.9 HG 6 CO 6.1 Cor 6.2 Cor 6.9 Cor 7 HR: 7.3 Duc 7.4 Staus 7.9 HR: 8.1 Ste 8.2 Tur 8.3 Cor 8.4 Ste 8.9 TG | Item/Description OT GAS CLEANUP & PIPING ransport Reactor Ulfur Recovery (Sulfuric Acid) hloride Guard articulate Removal owback Gas Systems uel Gas Piping GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | ES 43,435 w/6.1 | 1,736 2,099 376 \$4,211 | 3,069 4,079 1,710 1,026 988 1,594 253 \$12,718 3,306 w/6.1 | 215 286 120 72 69 112 18 \$890 | Tax | \$8,990 \$17,255 \$9,032 \$5,934 \$5,462 \$3,805 \$646 \$51,124 | 719 1,380 723 475 437 304 52 \$4,090 | 1,348 2,588 2,258 1,483 1,365 | 2,211 4,245 2,403 1,578 1,453 822 209 | \$13,269 \$25,469 \$14,415 \$9,470 \$8,717 \$4,931 | 33 64 36 24 22 12 2 |
|--|---|---|---|---|---|-----|--|---|---|---|---|---------------------------------------|
| 5 HO 5.1 Tran 5.2 Sult 5.3 Chl 5.4 Par 5.5 Bue 5.9 HG 6 CO 6.1 Cor 6.2 Cor 6.2 Cor 6.3 Cor 7 HR: 7.1 Hee 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Stee 8.2 Tur 8.3 Cor 8.4 Stee 8.9 TG | OT GAS CLEANUP & PIPING ransport Reactor ulfur Recovery (Sulfuric Acid) hloride Guard articulate Removal owback Gas Systems uel Gas Piping GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | 5,706 12,890 7,203 4,836 2,669 5. \$33,305 ES 43,435 w/6.1 | 1,736 2,099 376 \$4,211 | 3,069 4,079 1,710 1,026 988 1,594 253 \$12,718 | 215 286 120 72 69 112 18 \$890 | Tax | \$8,990 \$17,255 \$9,032 \$5,934 \$5,462 \$3,805 \$646 | 719 1,380 723 475 437 304 52 | 1,348 2,588 2,258 1,483 1,365 | 2,211 4,245 2,403 1,578 1,453 822 | \$13,269 \$25,469 \$14,415 \$9,470 \$8,717 \$4,931 | 33 64 36 24 22 12 |
| 5.1 Trains 5.2 Sulf 5.3 Child 5.4 Par 5.5 Blow 5.6 Fue 5.9 HG 6 CO 6.1 Cor 6.2 Cor 6.9 Cor 7 HR: 7.3 Duc 7.4 Staus 7.9 HR: 8.1 Ste 8.2 Tur 8.3 Cor 8.4 Ste 8.9 TG | ransport Reactor Ilfur Recovery (Sulfuric Acid) hloride Guard articulate Removal owback Gas Systems uel Gas Piping GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | 12,890 7,203 4,836 2,669 5. \$33,305 ES 43,435 w/6.1 | 2,099 376 \$4,211 | 4,079 1,710 1,026 988 1,594 253 \$12,718 | 286 120 72 69 112 18 \$890 | | \$17,255 \$9,032 \$5,934 \$5,462 \$3,805 \$646 | 1,380 723 475 437 304 52 | 2,588 2,258 1,483 1,365 | 4,245 2,403 1,578 1,453 822 | \$25,469 \$14,415 \$9,470 \$8,717 \$4,931 | 64 36 24 22 12 |
| 5.1 Trains 5.2 Sulf 5.3 Child 5.4 Par 5.5 Blow 5.6 Fue 5.9 HG 6 CO 6.1 Cor 6.2 Cor 6.9 Cor 7 HR: 7.3 Duc 7.4 Staus 7.9 HR: 8.1 Ste 8.2 Tur 8.3 Cor 8.4 Ste 8.9 TG | ransport Reactor Ilfur Recovery (Sulfuric Acid) hloride Guard articulate Removal owback Gas Systems uel Gas Piping GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | 12,890 7,203 4,836 2,669 5. \$33,305 ES 43,435 w/6.1 | 2,099 376 \$4,211 | 4,079 1,710 1,026 988 1,594 253 \$12,718 | 286 120 72 69 112 18 \$890 | | \$17,255 \$9,032 \$5,934 \$5,462 \$3,805 \$646 | 1,380 723 475 437 304 52 | 2,588 2,258 1,483 1,365 | 4,245 2,403 1,578 1,453 822 | \$25,469 \$14,415 \$9,470 \$8,717 \$4,931 | 64 36 24 22 12 |
| 5.2 Sulf 5.3 Chl 5.4 Fue 5.5 Bloo 5.6 Fue 5.9 HG 6 CO 6.1 Cor 6.3 Cor 6.9 Cor 7 HR: 7.3 Duc 7.4 Staur 7.9 HR: 8 STE 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | ulfur Recovery (Sulfuric Acid) hloride Guard articulate Removal owback Gas Systems uel Gas Piping GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | 12,890 7,203 4,836 2,669 5. \$33,305 ES 43,435 w/6.1 | 2,099 376 \$4,211 | 4,079 1,710 1,026 988 1,594 253 \$12,718 | 286 120 72 69 112 18 \$890 | | \$17,255 \$9,032 \$5,934 \$5,462 \$3,805 \$646 | 1,380 723 475 437 304 52 | 2,588 2,258 1,483 1,365 | 4,245 2,403 1,578 1,453 822 | \$25,469 \$14,415 \$9,470 \$8,717 \$4,931 | 64 36 24 22 12 |
| 5.3 Chli 5.4 Pari 5.5 Brue 5.9 HG 6 | hloride Guard articulate Removal owback Gas Systems uel Gas Piping GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | 7,203 4,836 2,669 5. \$33,305 ES 43,435 w/6.1 | 2,099 376 \$4,211 | 1,710 1,026 988 1,594 253 \$12,718 | 120 72 69 112 18 \$890 | | \$9,032 \$5,934 \$5,462 \$3,805 \$646 | 723 475 437 304 52 | 2,258 1,483 1,365 | 2,403 1,578 1,453 822 | \$14,415 \$9,470 \$8,717 \$4,931 | 36 24 22 12 |
| 5.4 Par 5.5 Blov 5.6 Fue 5.9 HG 6 CO 6.1 Cor 6.3 Cor 6.9 Cor 7 HR: 7.1 Hea 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Ste 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | articulate Removal owback Gas Systems uel Gas Piping GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | 4,836 2,669 5. \$33,305 ES 43,435 w/6.1 | 2,099 376 \$4,211 | 1,026 988 1,594 253 \$12,718 | 72 69 112 18 \$890 | | \$5,934 \$5,462 \$3,805 \$646 | 475 437 304 52 | 1,483 1,365 | 1,578 1,453 822 | \$9,470 \$8,717 \$4,931 | 24 22 12 |
| 5.5 Blov 5.6 Fue 5.9 HG 6 CO 6.1 Cor 6.2 Cor 6.9 Cor 7 HR: 7.1 Hee 7.2 HR: 7.3 Duc 7.4 Stau 7.9 HR: 8 STE 8.1 Ste 8.2 Tur 8.3 Cor 8.4 Ste 8.9 TG | owback Gas Systems Jel Gas Piping GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE Ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | 2,669 5. \$33,305 ES 43,435 w/6.1 | 2,099 376 \$4,211 | 988 1,594 253 \$12,718 3,306 | 69 112 18 \$890 | | \$5,462 \$3,805 \$646 | 437 304 52 | 1,365 | 1,453 822 | \$8,717 \$4,931 | 22 12 |
| 5.6 Fue 5.9 HG 5.9 HG 6 CO 6.1 Cor 6.2 Cor 6.3 Cor 6.9 Cor 7 HR: 7.1 Hee 7.2 HR: 7.3 Duc 7.4 Staue 8.8 STE 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | uel Gas Piping SCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | \$33,305 ES 43,435 w/6.1 | 2,099 376 \$4,211 | 1,594 253 \$12,718 3,306 | 112 18 \$890 | | \$3,805 \$646 | 304 52 | , | 822 | \$4,931 | 12 |
| 5.9 HG 6 CO 6.1 Cor 6.2 Cor 6.3 Cor 6.9 Cor 7 HR: 7.1 Hez 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | GCU Foundations SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | ES 43,435 w/6.1 | 376 \$4,211 148 | 253 \$12,718 3,306 | 18 \$890 | | \$646 | 52 | | | | |
| 6 CO 6.1 Cor 6.2 Cor 6.3 Cor 6.9 Cor 7 HR: 7.1 Hea 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Ste 8.2 Tur 8.3 Cor 8.4 Ste 8.9 TG | SUBTOTAL 5 OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | ES 43,435 w/6.1 | \$4,211 | \$12,718 3,306 | \$890 | | | | | | # # POOT | |
| 6.1 Cor 6.2 Cor 6.3 Cor 6.9 Cor 7 HR: 7.1 Hee 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Stee 8.2 Tur 8.3 Cor 8.4 Stee 8.9 TG | OMBUSTION TURBINE/ACCESSORIE ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | ES 43,435 w/6.1 | 148 | 3,306 | • | | | | \$9,044 | \$12,921 | \$907 \$77,179 | 194 |
| 6.1 Cor 6.2 Cor 6.3 Cor 6.9 Cor 7 HR: 7.1 Hee 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Stee 8.2 Tur 8.3 Cor 8.4 Stee 8.9 TG | ombustion Turbine Generator ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | 43,435 w/6.1 | | | 231 | | **** | φ4,030 | \$3,044 | \$12,321 | Ψ11,113 | 134 |
| 6.2 Cor 6.3 Cor 6.9 Cor 7 HR: 7.1 Hee 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | ombustion Turbine Accessories ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | w/6.1 | | | | | \$46,973 | 3,758 | 3,523 | 5,425 | \$59,680 | 150 |
| 6.3 Cor 6.9 Cor 7 HR: 7.1 Hea 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | ompressed Air Piping ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | | | W/O. I | 201 | | φ40,973 | 3,736 | 3,323 | 5,425 | φ39,000 | 130 |
| 6.9 Cor 7 HR: 7.1 Hee 7.2 HR: 7.3 Duc 7.4 Staar 7.9 HR: 8 STE 8.1 Stee 8.2 Tur 8.3 Cor 8.4 Stee 8.9 TG | ombustion Turbine Foundations SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | \$43,435 | | | | | | | | | | |
| 7 HR: 7.1 Hee 7.2 Hee 7.2 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | SUBTOTAL 6 RSG, DUCTING & STACK eat Recovery Steam Generator | \$43,435 | | 170 | 12 | | \$330 | 26 | | 107 | \$463 | 1 |
| 7.1 Hea 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | RSG, DUCTING & STACK eat Recovery Steam Generator | φ+3,433 | \$148 | \$3,477 | \$243 | | \$47,303 | \$3,784 | \$3,523 | \$5,532 | \$60.143 | 151 |
| 7.1 Hea 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | eat Recovery Steam Generator | | φ140 | φ3,477 | \$243 | | φ41,303 | ψ3,704 | \$3,323 | ψJ,JJ2 | \$00,143 | 131 |
| 7.2 HR: 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | | 12,666 | | 1,821 | 127 | | \$14,614 | 1,169 | | 1,578 | \$17,362 | 44 |
| 7.3 Duc 7.4 Star 7.9 HR: 8 STE 8.1 Ster 8.2 Turl 8.3 Cor 8.4 Ster 8.9 TG | | 12,000 | | 1,021 | 121 | | Ψ14,014 | 1,103 | | 1,576 | ψ17,302 | |
| 7.4 Star 7.9 HR: 8 STE 8.1 Ster 8.2 Tur 8.3 Cor 8.4 Ster 8.9 TG | | | 606 | 520 | 36 | | \$1,163 | 93 | | 251 | \$1,507 | 4 |
| 7.9 HR: 8 STE 8.1 Ster 8.2 Turi 8.3 Cor 8.4 Ster 8.9 TG | | 1,876 | 000 | 713 | 50 | | \$2,639 | 211 | | 285 | \$3,135 | 8 |
| 8 STE 8.1 Stea 8.2 Turl 8.3 Cor 8.4 Stea 8.9 TG | RSG,Duct & Stack Foundations | 1,070 | 92 | 92 | 6 | | \$191 | 15 | | 62 | \$268 | 1 |
| 8.1 Stea 8.2 Turl 8.3 Cor 8.4 Stea 8.9 TG | SUBTOTAL 7 | . \$14,543 | \$698 | \$3,146 | \$220 | | \$18,607 | \$1,489 | | \$2,176 | \$22,272 | 56 |
| 8.1 Stea 8.2 Turl 8.3 Cor 8.4 Stea 8.9 TG | TEAM TURBINE GENERATOR | . \$14,543 | \$090 | \$3,140 | \$220 | | \$10,007 | ֆ1,409 | | \$2,170 | \$22,212 | 30 |
| 8.2 Turl 8.3 Cor 8.4 Stea 8.9 TG | team TG & Accessories | 10.806 | | 1.978 | 138 | | \$12,922 | 1,034 | | 1,396 | \$15.351 | 39 |
| 8.3 Cor 8.4 Ste 8.9 TG | | -, | | , | | | | | | | | |
| 8.4 Stea 8.9 TG | urbine Plant Auxiliaries | 83 | | 192 | 13 | | \$289 | 23 | | 31 | \$343 | 1 |
| 8.9 TG | ondenser & Auxiliaries | 2,138 | | 592 | 41 | | \$2,771 | 222 | | 299 | \$3,292 | 8 |
| | | 3,035 | 400 | 1,599 | 112 | | \$4,746 | 380 | | 1,025 | \$6,150 | 15 |
| 9 (0 | G Foundations | | 160 | 500 | 35 | | \$695 | 56 | | 225 | \$976 | 2 |
| | SUBTOTAL 8 | . \$16,061 | \$160 | \$4,860 | \$340 | | \$21,422 | \$1,714 | | \$2,976 | \$26,112 | 66 |
| | OOLING WATER SYSTEM | | | | | | 20 =04 | | | | 0.1.100 | ! |
| | poling Towers | 2,845 | | 631 | 44 | | \$3,521 | 282 | | 380 | \$4,183 | 11 |
| | rculating Water Pumps | 416 | | 40 | 3 | | \$459 | 37 | | 50 | \$545 | 1 |
| | rc.Water System Auxiliaries | 51 | | 7 | _1 | | \$59 | _5 | | 6 | \$70 | 0 |
| | rc.Water Piping | | 987 | 1,109 | 78 | | \$2,173 | 174 | | 469 | \$2,816 | 7 |
| | ake-up Water System | 113 | | 170 | 12 | | \$295 | 24 | | 64 | \$382 | 1 |
| | omponent Cooling Water Sys | 288 | 344 | 256 | 18 | | \$905 | 72 | | 196 | \$1,173 | 3 |
| 9.9 Circ | rc.Water System Foundations | | 726 | 1,288 | 90 | | \$2,104 | 168 | | 682 | \$2,954 | 7 |
| | SUBTOTAL 9 | - +-, | \$2,057 | \$3,500 | \$245 | | \$9,515 | \$761 | | \$1,846 | \$12,123 | 30 |
| | SH/SPENT SORBENT HANDLING SY | | | | | | | | | | | |
| | asifier Ash Removal | 1,067 | | 572 | 40 | | \$1,679 | 134 | 252 | 310 | \$2,375 | 6 |
| | asifier Ash Depressurization | 438 | 21 | 100 | 7 | | \$566 | 45 | | 92 | \$703 | 2 |
| | | 1,046 | 129 | 231 | 16 | | \$1,423 | 114 | | 230 | \$1,767 | 4 |
| | eanup Ash Depressurization | | | | | | | | | | | - |
| | igh Temperature Ash Piping | | | | | | | | | | | - |
| 10.6 Ash | gh Temperature Ash Piping ther Ash Recovery Equipment | 247 | | 271 | 19 | | \$537 | 43 | | 87 | \$667 | 2 |
| 10.7 Ash | igh Temperature Ash Piping | | | 81 | 6 | | \$408 | 33 | | 66 | \$507 | 1 |
| 10.8 Mis | gh Temperature Ash Piping ther Ash Recovery Equipment | 322 | 626 | 189 | 13 | | \$1,340 | 107 | | 217 | \$1,664 | 4 |
| 10.9 Ash | igh Temperature Ash Piping ther Ash Recovery Equipment sh Storage Silos | 322 511 | | 28 | | | | | | | 1 | , |
| | igh Temperature Ash Piping ther Ash Recovery Equipment sh Storage Silos sh Transport & Feed Equipment | | 21 | 20 | 2 | | \$51 | 4 | | 16 | \$71 | 0 |

14-Aug-98

08:50 AM

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98
Project: Market Based Advanced Coal Power Systems 14-Aug-98
08:50 AM

TOTAL PLANT COST SUMMARY

Case: Transport Reactor (2010)
Plant Size: 398.1 MW,net

 Plant Size:
 398.1 MW,net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998
 (\$x1000)

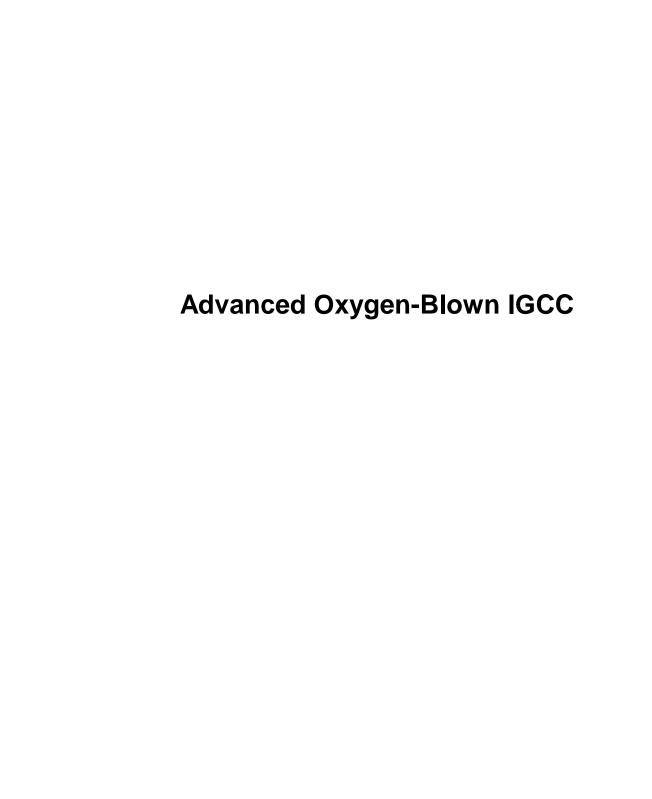
| Acct | | Equipment | Material | Lat | | | Bare Erected | | Conting | | TOTAL PLAN | |
|------|--------------------------------|-----------|---------------------|-------------|---------------|-----|--------------|------------------|------------------|-------------|---|-------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | | | | | | |
| | Generator Equipment | 1,393 | | 221 | 15 | | \$1,629 | 130 | | 176 | | |
| | Station Service Equipment | 2,015 | | 166 | 12 | | \$2,192 | 175 | | 237 | \$2,604 | |
| | Switchgear & Motor Control | 1,606 | | 267 | 19 | | \$1,892 | 151 | | 307 | \$2,350 | |
| | Conduit & Cable Tray | | 969 | 3,039 | 213 | | \$4,220 | 338 | | 911 | \$5,469 | |
| | Wire & Cable | | 1,040 | 1,038 | 73 | | \$2,151 | 172 | | 465 | | |
| | Protective Equipment | | 85 | 283 | 20 | | \$388 | 31 | | 63 | | |
| | Standby Equipment | 646 | | 14 | 1 | | \$661 | 53 | | 107 | | 2 |
| | Main Power Transformers | 3,281 | | 368 | 26 | | \$3,674 | 294 | | 595 | | |
| 11.9 | Electrical Foundations | | 158 | 438 | 31 | | \$627 | 50 | | 203 | | |
| | SUBTOTAL 11. | \$8,939 | \$2,252 | \$5,834 | \$408 | | \$17,434 | \$1,395 | | \$3,063 | \$21,892 | 55 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| 12.1 | IGCC Control Equipment | | | | | | | | | | | |
| 12.2 | Combustion Turbine Control | | | | | | | | | | | |
| 12.3 | Steam Turbine Control | | | | | | | | | | | |
| 12.4 | Other Major Component Control | 490 | | 299 | 21 | | \$811 | 65 | | 131 | \$1,007 | 3 |
| 12.5 | Signal Processing Equipment | w/12.7 | | w/12.7 | | | | | | | | |
| 12.6 | Control Boards, Panels & Racks | 118 | | 69 | 5 | | \$191 | 15 | | 41 | \$248 | 1 |
| 12.7 | Computer & Accessories | 3,751 | | 137 | 10 | | \$3,898 | 312 | | 421 | \$4,630 | 12 |
| 12.8 | Instrument Wiring & Tubing | , | 1,463 | 4,547 | 318 | | \$6,328 | 506 | | 1,367 | \$8,201 | 21 |
| 12.9 | Other I & C Equipment | 863 | , | 383 | 27 | | \$1,273 | 102 | | 138 | \$1,513 | 4 |
| | SUBTOTAL 12. | \$5,222 | \$1,463 | \$5,436 | \$380 | | \$12,501 | \$1,000 | | \$2,098 | | |
| 13 | IMPROVEMENTS TO SITE | , , | . , | , | • | | , , | ', | | . , | , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | |
| | Site Preparation | | 31 | 617 | 43 | | \$692 | 55 | | 224 | \$971 | 2 |
| | Site Improvements | | 1,031 | 1,273 | 89 | | \$2,393 | 191 | | 775 | | |
| | Site Facilities | 1.848 | ., | 1,811 | 127 | | \$3,786 | 303 | | 1.227 | \$5,316 | |
| | SUBTOTAL 13. | \$1,848 | \$1,063 | \$3,701 | \$259 | | \$6,872 | \$550 | | \$2,226 | | |
| 14 | BUILDINGS & STRUCTURES | 41,212 | * -, | 4 -, | * | | 73,512 | **** | | + -, | 70,010 | |
| | Combustion Turbine Area | | 223 | 141 | 10 | | \$374 | 30 | | 101 | \$504 | 1 |
| | Steam Turbine Building | | 1.757 | 2,786 | 195 | | \$4,738 | 379 | | 1,279 | | |
| | Administration Building | | 424 | 343 | 24 | | \$791 | 63 | | 214 | | |
| | Circulation Water Pumphouse | | 84 | 49 | 3 | | \$136 | 11 | | 37 | \$184 | |
| | Water Treatment Buildings | | 529 | 575 | 40 | | \$1,144 | 92 | | 309 | | |
| | Machine Shop | | 217 | 165 | 12 | | \$394 | 32 | | 106 | | |
| | Warehouse | | 351 | 252 | 18 | | \$620 | 50 | | 167 | \$837 | |
| | Other Buildings & Structures | | 210 | 182 | 13 | | \$405 | 32 | | 107 | | |
| | Waste Treating Building & Str. | | 470 | 999 | 70 | | \$1.539 | 123 | | 415 | | |
| 17.3 | SUBTOTAL 14. | | \$4,264 | \$5,493 | \$3 84 | | \$10,141 | \$811 | | \$2,738 | + /- | |
| | SUBTOTAL 14. | | φ 4 ,204 | φ3,433 | \$304 | | \$10,141 | 3011 | | Ψ2,130 | \$13,091 | 34 |
| | TOTAL COST | \$173,578 | \$26,057 | \$76,699 | \$5,369 | | \$281,703 | \$22,536 | \$21,471 | \$56,850 | \$382,559 | 961 |
| | TOTAL COST | φ113,310 | φ20,037 | φιυ,υ33 | φυ,υυσ | | Ψ201,703 | Ψ ∠∠ ,330 | Ψ ∠ 1,4/1 | φυυ,υυυ | ψ302,333 | 301 |

| CONTINGENCY FACTORS Transport Reactor (2010) | | | | | | | | |
|--|------------------------|-----------------|--|--|--|--|--|--|
| | Contingency Factors(%) | | | | | | | |
| Item/Description | %Process | <u>%Project</u> | | | | | | |
| COAL & SORBENT HANDLING | | 20.0 | | | | | | |
| COAL & SORBENT PREP & FEED | 3.4 | 20.0 | | | | | | |
| FEEDWATER & MISC. BOP SYSTEMS | | 24.0 | | | | | | |
| GASIFIER & ACCESSORIES | | | | | | | | |
| Gasifier & Auxiliaries | 25.0 | 20.0 | | | | | | |
| High Temperature Cooling | 15.0 | 20.0 | | | | | | |
| Recycle Gas System | 15.0 | 20.0 | | | | | | |
| Other Gasification Equipment | 8.4 | 23.4 | | | | | | |
| HOT GAS CLEANUP & PIPING | 17.7 | 20.1 | | | | | | |
| COMBUSTION TURBINE/ACCESSORIES | | | | | | | | |
| Combustion Turbine Generator | 7.5 | 10.0 | | | | | | |
| Combustion Turbine Accessories | | 30.0 | | | | | | |
| HRSG, DUCTING & STACK | | | | | | | | |
| Heat Recovery Steam Generator | | 10.0 | | | | | | |
| HRSG Accessories, Ductwork and Stack | | 13.9 | | | | | | |
| STEAM TURBINE GENERATOR | | | | | | | | |
| Steam TG & Accessories | | 10.0 | | | | | | |
| Turbine Plant Auxiliaries and Steam Piping | | 17.2 | | | | | | |
| COOLING WATER SYSTEM | | 18.0 | | | | | | |
| ASH/SPENT SORBENT HANDLING SYS | 4.2 | 15.1 | | | | | | |
| ACCESSORY ELECTRIC PLANT | | 16.3 | | | | | | |
| INSTRUMENTATION & CONTROL | | 15.5 | | | | | | |
| IMPROVEMENTS TO SITE | | 30.0 | | | | | | |
| BUILDINGS & STRUCTURES | | 25.0 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| OPERATING LABOR R | EQUIREMENTS | | | | | | | |
|--|---------------|--------------|--|--|--|--|--|--|
| Transport Reactor (2010) | | | | | | | | |
| Operating Labor Rate(base): 25.89 \$/hour | | | | | | | | |
| Operating Labor Burden: | 30.00 % of ba | se | | | | | | |
| Labor O-H Charge Rate: 25.00 % of labor | | | | | | | | |
| Operating Labor Requirements(O.J.)per Shift: | | Total | | | | | | |
| Category | 1 unit/mod. | <u>Plant</u> | | | | | | |
| Skilled Operator | 2.0 | 2.0 | | | | | | |
| Operator | 10.0 | 10.0 | | | | | | |
| Foreman | 1.0 | 1.0 | | | | | | |
| Lab Tech's, etc. | <u>3.0</u> | <u>3.0</u> | | | | | | |
| TOTAL-O.J.'s | 16.0 | 16.0 | | | | | | |

| CONSUMABLES, BY-PRODUCTS & F | UELS DATA | | |
|---|----------------|--------|--------|
| Transport Reactor (2010) | | | |
| | Consum | nption | Unit |
| Item/Description | <u>Initial</u> | /Day | _Cost_ |
| Water(/1000 gallons) | | 2,117 | 0.80 |
| Chemicals* | | | |
| MU & WT Chem.(lbs)** | 189,152 | 6,305 | 0.16 |
| Limestone (ton)** | | | 16.25 |
| Z Sorb (lbs)** | 20,517 | 683.9 | 3.50 |
| Nahcolite(ton)** | 82 | 2.7 | 270.00 |
| Other Supplemental Fuel(MBtu)** Gases,N2 etc.(/100scf) L.P. Steam(/1000 pounds) | | | |
| Waste Disposal | | | |
| Sludge(ton) Slag(ton) | | 273 | 10.00 |
| By-products & Emissions Sulfuric Acid(pounds) | | 215 | 68.00 |
| Fuel(ton) | | 2,813 | 29.29 |

| Transport Reactor (2010) | Maintenanc |
|--|------------|
| Item/Description | % |
| COAL & SORBENT HANDLING | 2.0 |
| COAL & SORBENT PREP & FEED | 3.′ |
| FEEDWATER & MISC. BOP SYSTEMS | 1.9 |
| GASIFIER & ACCESSORIES | |
| Gasifier & Auxiliaries | 5.0 |
| High Temperature Cooling | 4.5 |
| Recycle Gas System | 4.0 |
| Other Gasification Equipment | 2.8 |
| HOT GAS CLEANUP & PIPING | 4.4 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | 14.2 |
| Combustion Turbine Accessories | 0.8 |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | 2.0 |
| HRSG Accessories, Ductwork and Stack | 1.8 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 1.5 |
| Turbine Plant Auxiliaries and Steam Piping | 1. |
| COOLING WATER SYSTEM | 1.3 |
| ASH/SPENT SORBENT HANDLING SYS | 3 |
| ACCESSORY ELECTRIC PLANT | 1.3 |
| INSTRUMENTATION & CONTROL | 1.0 |
| IMPROVEMENTS TO SITE | 1.: |
| BUILDINGS & STRUCTURES | 1.4 |



| CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY | | | | | | | | | |
|--|--------------------|-------------|--------------------|--|--|--|--|--|--|
| TITLE/DEFINITION | | | | | | | | | |
| Case: | Destec (2010-"H") | | | | | | | | |
| Plant Size: | 427.7 (MW,net) | HeatRate: | 6,968 (Btu/kWh) | | | | | | |
| Primary/Secondary Fuel(type): | Illnois #6 | Cost: | 1.26 (\$/MMBtu) | | | | | | |
| Design/Construction: | 2.5 (years) | BookLife: | 20 (years) | | | | | | |
| TPC(Plant Cost) Year: | 1998 (Jan.) | TPI Year: | 2005 (Jan.) | | | | | | |
| Capacity Factor: | 85 (%) | | | | | | | | |
| CAPITAL INVESTMENT | | \$x1000 | \$/kW | | | | | | |
| Process Capital & Facilities | | 363,220 | 849.2 | | | | | | |
| Engineering(incl.C.M.,H.O.& Fee) | | 29,058 | 67.9 | | | | | | |
| Process Contingency | | 14,258 | 33.3 | | | | | | |
| Project Contingency | | 58,589 | 137.0 | | | | | | |
| TOTAL PLANT COST(TPC) | | \$465,125 | 1087.4 | | | | | | |
| TOTAL CASH EXPENDED | \$465,125 | | 1007.1 | | | | | | |
| AFDC | \$28,647 | | | | | | | | |
| TOTAL PLANT INVESTMENT(TPI) | Ψ=0,0 | \$493,772 | 1154.4 | | | | | | |
| Dovolty Alloyenge | | | | | | | | | |
| Royalty Allowance Preproduction Costs | | 12,171 | 28.5 | | | | | | |
| Inventory Capital | | 3,781 | 8.8 | | | | | | |
| Initial Catalyst & Chemicals(w/equip.) | | , | | | | | | | |
| Land Cost | | 450 | 1.1 | | | | | | |
| TOTAL CAPITAL REQUIREMENT(TCR |) | \$510,175 | 1192.7 | | | | | | |
| OPERATING & MAINTENANCE COSTS (1998 D | ollars) | \$x1000 | \$/kW-yr | | | | | | |
| Operating Labor | <u></u> | 4,717 | 11.0 | | | | | | |
| Maintenance Labor | | 3,855 | 9.0 | | | | | | |
| Maintenance Material | | 5,782 | 13.5 | | | | | | |
| Administrative & Support Labor | | 2,143 | 5.0 | | | | | | |
| TOTAL OPERATION & MAINTENANCE | <u> </u> | \$16,497 | 38.6 | | | | | | |
| FIXED O & M | | | 32.78 \$/kW-yr | | | | | | |
| VARIABLE O & M | | | 0.08 ¢/kWh | | | | | | |
| CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars) | \$x1000 | ¢/kWh | | | | | | |
| Water | | 633 | 0.02 | | | | | | |
| Chemicals | | 1,489 | 0.05 | | | | | | |
| Other Consumables Waste Disposal | | 948 | 0.03 | | | | | | |
| Waste Disposal | | 940 | 0.03 | | | | | | |
| TOTAL CONSUMABLE OPERATING C | OSTS | \$3,070 | 0.10 | | | | | | |
| BY-PRODUCT CREDITS (1998 Dollars) | | (\$4,942) | -0.16 | | | | | | |
| FUEL COST (1998 Dollars) | | \$27,855 | 0.87 | | | | | | |
| | 1st Year (2005 \$) | | zed (10th.Year \$) | | | | | | |
| PRODUCTION COST SUMMARY | <u>¢/kWh</u> | - | <u>¢/kWh</u> | | | | | | |
| Fixed O & M | 32.8/kW-yr 0.44 | , | 0.44 | | | | | | |
| Variable O & M | 0.08 | | 0.08 | | | | | | |
| Consumables By-product Credit | 0.10 -0.16 | | 0.10 -0.16 | | | | | | |
| Fuel | | | | | | | | | |
| TOTAL PRODUCTION COST | 0.79 1.25 | | 0.75_ 1.21 | | | | | | |
| LEVELIZED CARRYING CHARGES(Capital) | | 161.0/kW-yr | 2.16 | | | | | | |
| LEVELIZED (40)LV | | | 0.00 | | | | | | |
| LEVELIZED (10th.Year) BUSBAR COST OF PO | VV⊏K | | 3.38 | | | | | | |

| ESTIMATE BASIS/FINANCIAL CRIT | RIA for REVENUE REQUIREME | NT CALCULATIONS |
|--|--|-----------------|
| GENERAL DATA/CHARACTERISTICS | | |
| Case Title: | Destec (2010-"H" | ") |
| Unit Size:/Plant Size: | 427.7 MW, | net 427.7 MWe |
| Location: | Middletown, USA | ı. |
| Fuel: Primary/Secondary | Illnois #6 | |
| Energy From Primary/Secondary Fuels | 6,968 Btu/k | kWh Btu/kWh |
| Levelized Capacity Factor / Preproduction(equiv | ellent months): 85 % | 1 months |
| Capital Cost Year Dollars (Reference Year Dollars) | rs): 1998 (Janu | uary) |
| Delivered Cost of Primary/Secondary Fuel | 1.26 \$/ME | 3tu \$/MBtu |
| Design/Construction Period: | 2.5 years | S |
| Plant Startup Date (1st. Year Dollars): | 2005 (Janu | uary) |
| Land Area/Unit Cost | 300 acre | \$1,500 /acre |
| FINANCIAL CRITERIA | | |
| Project Book Life: | 20 years | S |
| Book Salvage Value: | % | |
| Project Tax Life: | 20 years | S |
| Tax Depreciation Method: | Accel. based on A | ACRS Class |
| Property Tax Rate: | 1.0 % pe | er year |
| Insurance Tax Rate: | 1.0 % pe | er year |
| Federal Income Tax Rate: | 34.0 % | |
| State Income Tax Rate: | 6.0 % | |
| Investment Tax Credit/% Eligible | % | % |
| Economic Basis: | 10th.Year Cons | stant Dollars |
| Capital Structure Common Equity Preferred Stock | % of Total 20 | Cost(%)16.5 |
| Debt Weighted Cost of Capital:(after tax) | 80 | 5.8 6.2 % |
| Escalation Rates | Over Book Life General % pe Primary Fuel -1.1 % pe Secondary Fuel 1.2 % pe | |

 Client:
 DEPARTMENT OF ENERGY
 Report Date:
 14-Aug-98

 Project:
 Market Based Advanced Coal Power Systems
 11:02 AM

TOTAL PLANT COST SUMMARY

 Case:
 Destec (2010-"H")

 Plant Size:
 427.7 MW,net

Plant Size: 427.7 MW net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| Acct | | Equipment | Material | Lal | oor | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
|---------|--|-----------|----------|----------|----------|-------|--------------|-----------|----------|----------|-------------|-------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| | • | | | | | • | | | • | | | |
| 1 | COAL & SORBENT HANDLING | 5,752 | 1,154 | 5,023 | 352 | | \$12,281 | 982 | | 2,653 | \$15,916 | 37 |
| 2 | COAL & SORBENT PREP & FEED | 6,977 | 1,605 | 7,535 | 527 | | \$16,644 | 1,332 | 559 | 2,444 | \$20,978 | 49 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 5,803 | 2,825 | 4,504 | 315 | | \$13,447 | 1,076 | | 3,505 | \$18,028 | 42 |
| 4 | GASIFIER & ACCESSORIES | | | | | | | | | | | |
| 4.1 | Gasifier & Auxiliaries(Destec) | 9,257 | | 9,429 | 660 | | \$19,346 | 1,548 | 1,935 | 2,283 | \$25,111 | 59 |
| | High Temperature Cooling | 15,118 | | 15,405 | 1.078 | | \$31,602 | 2,528 | 3,160 | 3,729 | \$41,019 | 96 |
| | ASU/Oxidant Compression | 57,300 | | w/equip. | , | | \$57,300 | 4,584 | -, | 6,188 | \$68,072 | 159 |
| | Other Gasification Equipment | 0.,000 | 3.924 | 2.194 | 154 | | \$6,271 | 502 | | 1.793 | \$8,566 | 20 |
| 1.1 1.0 | SUBTOTAL 4 | 81,675 | 3,924 | 27,027 | 1,892 | | \$114,519 | 9,161 | 5,095 | 13,993 | \$142,768 | 334 |
| 5 | HOT GAS CLEANUP & PIPING | 26,369 | 2,264 | 9,371 | 656 | | \$38,659 | 3,093 | 4,547 | 9,438 | \$55,737 | 130 |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | | | | | | | | | | |
| 6.1 | Combustion Turbine Generator | 43,435 | | 3.306 | 231 | | \$46.973 | 3.758 | 3.523 | 5.425 | \$59.680 | 140 |
| | Combustion Turbine Accessories | , | 148 | 170 | 12 | | \$330 | 26 | -, | 107 | \$463 | 1 |
| 0.2 0.0 | SUBTOTAL 6 | 43,435 | 148 | 3,477 | 243 | | \$47,303 | 3,784 | 3,523 | 5,532 | \$60,143 | 141 |
| 7 | HRSG. DUCTING & STACK | | | | | | | | | | | |
| 7.1 | Heat Recovery Steam Generator | 13,255 | | 1,905 | 133 | | \$15,294 | 1,224 | | 1,652 | \$18,169 | 42 |
| | HRSG Accessories, Ductwork and Stack | 1,997 | 743 | 1,410 | 99 | | \$4,249 | 340 | | 637 | \$5,226 | 12 |
| | SUBTOTAL 7 | 15,252 | 743 | 3,316 | 232 | | \$19,543 | 1,563 | | 2,288 | \$23,395 | 55 |
| 8 | STEAM TURBINE GENERATOR | | | | | | | | | | | |
| 8.1 | Steam TG & Accessories | 11,689 | | 2,140 | 150 | | \$13,978 | 1,118 | | 1,510 | \$16,606 | 39 |
| 8.2-8.9 | Turbine Plant Auxiliaries and Steam Piping | 5.646 | 172 | 3.097 | 217 | | \$9,132 | 731 | | 1,698 | \$11,561 | 27 |
| | SUBTOTAL 8 | 17,335 | 172 | 5,236 | 367 | | \$23,110 | 1,849 | | 3,208 | \$28,167 | 66 |
| 9 | COOLING WATER SYSTEM | 3,997 | 2,227 | 3,766 | 264 | | \$10,253 | 820 | | 1,991 | \$13,064 | 31 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | 3,726 | 686 | 3,177 | 222 | | \$7,811 | 625 | 534 | 1,039 | \$10,009 | 23 |
| 11 | ACCESSORY ELECTRIC PLANT | 12,384 | 4,091 | 10,067 | 705 | | \$27,247 | 2,180 | | 4,858 | \$34,285 | 80 |
| 12 | INSTRUMENTATION & CONTROL | 6,517 | 1,548 | 5,752 | 403 | | \$14,220 | 1,138 | | 2,327 | \$17,685 | 41 |
| 13 | IMPROVEMENTS TO SITE | 2,006 | 1,153 | 4,017 | 281 | | \$7,458 | 597 | | 2,416 | \$10,471 | 24 |
| 14 | BUILDINGS & STRUCTURES | | 4,505 | 5,812 | 407 | | \$10,724 | 858 | | 2,895 | \$14,477 | 34 |
| | | | , | • | | | | | | , | | |
| | TOTAL COST | \$231,228 | \$27,045 | \$98,081 | \$6,866 | | \$363,220 | \$29,058 | \$14,258 | \$58,589 | \$465,125 | 1087 |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98 11:02 AM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Destec (2010-"H") 427.7 MW,net Case:

Plant Size: Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| | riant Size. | 721.1 | ivivv ,i iet | Loui | nate Type. | Conce | ptuai | | st base (Jail) | 1330 | (ΦΧ1000) | |
|------|---|------------|-------------------------|----------------|---------------|-------|-----------------|-----------|----------------|-----------------|----------------|-------|
| Acct | | Equipment | Material | Lal | | | Bare Erected | | Conting | | TOTAL PLANT | |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | | | | | | | | | | | |
| 1.1 | Coal Receive & Unload | 1,510 | | 831 | 58 | | \$2,400 | 192 | | 518 | \$3,110 | 7 |
| 1.2 | Coal Stackout & Reclaim | 1,952 | | 533 | 37 | | \$2,522 | 202 | | 545 | \$3,268 | 8 |
| 1.3 | Coal Conveyors & Yd Crush | 1,815 | | 527 | 37 | | \$2,379 | 190 | | 514 | \$3,083 | 7 |
| 1.4 | Other Coal Handling | 475 | | 122 | 9 | | \$605 | 48 | | 131 | \$784 | 2 |
| | Sorbent Receive & Unload | | | | | | | | | | , , | |
| 1.6 | Sorbent Stackout & Reclaim | | | | | | | | | | | |
| 1.7 | Sorbent Conveyors | | | | | | | | | | | |
| | Other Sorbent Handling | | | | | | | | | | | |
| | Coal & Sorbent Hnd.Foundations | | 1,154 | 3,010 | 211 | | \$4,375 | 350 | | 945 | \$5,670 | 13 |
| | SUBTOTAL 1. | \$5,752 | \$1,154 | \$5,023 | \$352 | | \$12,281 | \$982 | | \$2,653 | \$15,916 | 37 |
| 2 | COAL & SORBENT PREP & FEED | 40,.02 | V .,. v . | 40,020 | 400- | | 4.2,20 . | •••• | | \$ 2,000 | V.0,0.0 | • |
| | Coal Crushing & Drying | 967 | 151 | 363 | 25 | | \$1,506 | 121 | | 325 | \$1,952 | 5 |
| | Prepared Coal Storage & Feed | 333 | 75 | 59 | 4 | | \$470 | 38 | | 102 | \$609 | 1 |
| | Slurry Prep & Feed | 5,394 | 73 | 5,403 | 378 | | \$11,175 | 894 | 559 | 1,263 | \$13,891 | 32 |
| | Misc.Coal Prep & Feed | 283 | 193 | 695 | 49 | | \$1,218 | 97 | 000 | 263 | \$1,579 | 4 |
| | Sorbent Prep Equipment | 203 | 193 | 033 | 43 | | Ψ1,210 | 31 | | 203 | ψ1,573 | 7 |
| | Sorbent Trep Equipment Sorbent Storage & Feed | | | | | | | | | | | |
| | Sorbent Injection System | | | | | | | | | | | |
| | Booster Air Supply System | | | | | | | | | | | |
| | Coal & Sorbent Feed Foundation | | 1,187 | 1,016 | 71 | | \$2,274 | 182 | | 491 | \$2,947 | 7 |
| 2.9 | SUBTOTAL 2. | \$6,977 | \$1,605 | \$7,535 | \$527 | | \$16,644 | \$1,332 | \$559 | \$2,444 | \$20,978 | 49 |
| | FEEDWATER & MISC. BOP SYSTEMS | \$0,977 | \$1,000 | Φ1 ,535 | \$32 <i>1</i> | | \$10,044 | ३।,३३८ | | \$2,444 | \$20,976 | 49 |
| 3 | | 000 | 1.573 | 040 | 50 | | ₽0.004 | 000 | | 700 | £4.050 | 40 |
| | FeedwaterSystem | 809 376 | , | 840 216 | 59 15 | | \$3,281 | 262 | | 709 210 | \$4,252 | 10 |
| | Water Makeup & Pretreating | 482 | 40 | | | | \$647 | 52 67 | | | \$909 | 2 |
| | Other Feedwater Subsystems | | 180 | 164 | 11 | | \$837 | | | 181 | \$1,084 | 3 |
| | Service Water Systems | 29 | 62 | 218 | 15 | | \$324 | 26 | | 105 | \$456 | 1 |
| | Other Boiler Plant Systems | 1,230 | 497 | 1,244 | 87 | | \$3,059 | 245 | | 661 | \$3,964 | 9 |
| | FO Supply Sys & Nat Gas | 106 | 199 | 376 | 26 | | \$707 | 57 | | 153 | \$917 | 2 |
| | Waste Treatment Equipment | 748 | | 438 | 31 | | \$1,217 | 97 | | 394 | \$1,709 | 4 |
| 3.8 | Misc. Power Plant Equipment | 2,023 | 274 | 1,008 | 71 | | \$3,375 | 270 | | 1,093 | \$4,738 | 11 |
| | SUBTOTAL 3. | \$5,803 | \$2,825 | \$4,504 | \$315 | | \$13,447 | \$1,076 | | \$3,505 | \$18,028 | 42 |
| 4 | GASIFIER & ACCESSORIES | | | | | | | | | | | |
| | Gasifier & Auxiliaries(Destec) | 9,257 | | 9,429 | 660 | | \$19,346 | 1,548 | 1,935 | 2,283 | \$25,111 | 59 |
| | High Temperature Cooling | 15,118 | | 15,405 | 1,078 | | \$31,602 | 2,528 | 3,160 | 3,729 | \$41,019 | 96 |
| | ASU/Oxidant Compression | 57,300 | | w/equip. | | | \$57,300 | 4,584 | | 6,188 | \$68,072 | 159 |
| | Booster Air Compression | | | | | | | | | | | |
| | Misc. Gasification Equipment | w/4.1&4.2 | | w/4.1&4.2 | | | | | | | | |
| | Other Gasification Equipment | | 767 | 316 | 22 | | \$1,105 | 88 | | 119 | \$1,313 | 3 |
| | Major Component Rigging | w/4.1&4.2 | | w/4.1&4.2 | | | | | | | | |
| 4.9 | Gasification Foundations | | 3,157 | 1,878 | 131 | | \$5,166 | 413 | | 1,674 | \$7,253 | 17 |
| | SUBTOTAL 4. | \$81,675 | \$3,924 | \$27,027 | \$1,892 | | \$114,519 | \$9,161 | \$5,095 | \$13,993 | \$142,768 | 334 |

Client: DEPARTMENT OF ENERGY

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

 Case:
 Destec (2010-"H")

 Plant Size:
 427.7 MW,net

Plant Size: 427.7 MW,net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| A = c + | | Familia mana a sa | Matarial | | | Cala | Dana Francis I | F., 014 | 04' | ! | TOTAL DI ANT | T200 |
|-------------|---------------------------------|-------------------|------------------|----------------|--------------|--------------|-------------------------|-----------|---------|---------|--------------|--------|
| Acct No. | Item/Description | Equipment Cost | Material Cost | Lak Direct | Indirect | Sales Tax | Bare Erected Cost \$ | H.O.& Fee | Conting | | TOTAL PLANT | \$/kW |
| NO. | item/Description | Cost | Cost | Direct | indirect | тах | Cost \$ | H.O.& Fee | Process | Project | • | \$/KVV |
| 5 | HOT GAS CLEANUP & PIPING | | | | | | | | | | | |
| | Transport Reactor | 4.126 | | 2,219 | 155 | | \$6.500 | 520 | 975 | 1.599 | \$9.595 | 22 |
| | Sulfur Recovery (Sulfuric Acid) | 13,608 | | 4,306 | 301 | | \$18,216 | 1,457 | 911 | 4,117 | \$24,701 | 58 |
| | Chloride Guard | 3,255 | | 772 | 54 | | \$4,081 | 326 | 1,020 | 1,086 | \$6,514 | 15 |
| | Particulate Removal | 4,163 | | 513 | 36 | | \$4,712 | 377 | 1,178 | 1,253 | \$7,520 | 18 |
| | Blowback Gas Systems | 1,217 | 396 | 225 | 16 | | \$1,853 | 148 | 463 | 493 | \$2,958 | 7 |
| | Fuel Gas Piping | 1,217 | 910 | 691 | 48 | | \$1,649 | 132 | 403 | 356 | \$2,330 | 5 |
| | HGCU Foundations | | 958 | 644 | 45 | | \$1,647 | 132 | | 534 | \$2,313 | 5 |
|] 3.3 | SUBTOTAL 5. | \$26,369 | \$2,264 | \$9,371 | \$656 | | \$38,659 | \$3,093 | \$4,547 | \$9,438 | \$55,737 | 130 |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | Ψ2,204 | ψ3,37 1 | ΨΟΟΟ | | \$50,055 | ψ5,055 | ψ4,541 | ψ3,430 | ψ55,757 | 130 |
| | Combustion Turbine Generator | 43,435 | | 3,306 | 231 | | \$46,973 | 3,758 | 3,523 | 5,425 | \$59,680 | 140 |
| | Combustion Turbine Accessories | w/6.1 | | w/6.1 | 231 | | ψ40,973 | 3,730 | 3,323 | 5,425 | ψ59,000 | 140 |
| | Compressed Air Piping | W/O. 1 | | W/O. I | | | | | | | | |
| | Combustion Turbine Foundations | | 148 | 170 | 12 | | \$330 | 26 | | 107 | \$463 | 1 |
| 0.5 | SUBTOTAL 6. | \$43,435 | \$148 | \$3,477 | \$243 | | \$47,303 | \$3,784 | \$3,523 | \$5,532 | \$60,143 | 141 |
| 7 | HRSG, DUCTING & STACK | ψ+3,+33 | Ψ140 | ψ5,477 | Ψ2-43 | | Ψ-1,505 | ψ5,704 | ψ3,323 | ψ5,552 | ψου,143 | |
| 1 | Heat Recovery Steam Generator | 13,255 | | 1,905 | 133 | | \$15,294 | 1,224 | | 1,652 | \$18,169 | 42 |
| | HRSG Accessories | 10,200 | | 1,505 | 100 | | ψ13,234 | 1,224 | | 1,002 | ψ10,103 | 72 |
| 1 | Ductwork | | 645 | 554 | 39 | | \$1,238 | 99 | | 267 | \$1,604 | 4 |
| | Stack | 1,997 | 045 | 758 | 53 | | \$2,809 | 225 | | 303 | \$3,337 | 8 |
| | HRSG,Duct & Stack Foundations | 1,997 | 98 | 98 | 7 | | \$2,809 | 16 | | 66 | \$285 | 1 |
| /.8 | SUBTOTAL 7. | \$15,252 | \$743 | \$3,316 | \$232 | | \$19,543 | \$1,563 | | | \$23,395 | 55 |
| 8 | STEAM TURBINE GENERATOR | \$15,252 | \$143 | \$3,310 | \$232 | | \$19,543 | \$1,563 | | \$2,288 | \$23,395 | 55 |
| 1 - | Steam TG & Accessories | 11,689 | | 2.140 | 150 | | \$13.978 | 1.118 | | 1,510 | \$16.606 | 39 |
| 1 | | | | , - | 14 | | | , - | | | , | |
| | Turbine Plant Auxiliaries | 89 | | 207 | | | \$310 | 25 | | 33 | \$368 | 1 |
| 8.3 | | 2,297 | | 635 | 44 | | \$2,977 | 238 | | 321 | \$3,536 | 8 |
| | Steam Piping | 3,261 | | 1,718 | 120 | | \$5,099 | 408 | | 1,101 | \$6,608 | 15 |
| 8.9 | | | 172 | 537 | 38 | | \$747 | 60 | | 242 | \$1,048 | 2 |
| | SUBTOTAL 8. | \$17,335 | \$172 | \$5,236 | \$367 | | \$23,110 | \$1,849 | | \$3,208 | \$28,167 | 66 |
| 9 | COOLING WATER SYSTEM | | | 070 | | | 40 ==0 | | | | | |
| | Cooling Towers | 3,048 | | 676 | 47 | | \$3,772 | 302 | | 407 | \$4,481 | 10 |
| | Circulating Water Pumps | 446 | | 43 | 3 | | \$491 | 39 | | 53 | \$584 | 1 |
| | Circ.Water System Auxiliaries | 54 | | | 1 | | \$63 | 5 | | . 7 | \$75 | 0 |
| | Circ.Water Piping | | 1,057 | 1,188 | 83 | | \$2,328 | 186 | | 503 | \$3,017 | 7 |
| | Make-up Water System | 121 | | 182 | 13 | | \$316 | 25 | | 68 | \$409 | 1 |
| | Component Cooling Water Sys | 327 | 392 | 291 | 20 | | \$1,030 | 82 | | 223 | \$1,335 | 3 |
| 9.9 | Circ.Water System Foundations | | 778 | 1,379 | 97 | | \$2,254 | 180 | | 730 | \$3,164 | 7 |
| | SUBTOTAL 9. | \$3,997 | \$2,227 | \$3,766 | \$264 | | \$10,253 | \$820 | | \$1,991 | \$13,064 | 31 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | | | | | | | | | | | |
| | Slag Dewatering & Cooling | 2,582 | | 2,574 | 180 | | \$5,336 | 427 | 534 | 630 | \$6,926 | 16 |
| | Gasifier Ash Depressurization | | | | | | | | | | | |
| 10.3 | Cleanup Ash Depressurization | | | | | | | | | | | |
| | High Temperature Ash Piping | | | | | | | | | | | |
| | Other Ash Recovery Equipment | | | | | | | | | | | |
| 10.6 | Ash Storage Silos | 262 | | 288 | 20 | | \$569 | 46 | | 92 | \$707 | 2 |
| 10.7 | Ash Transport & Feed Equipment | 341 | | 86 | 6 | | \$432 | 35 | | 70 | \$537 | 1 |
| 10.8 | Misc. Ash Handling Equipment | 542 | 664 | 200 | 14 | | \$1,420 | 114 | | 230 | \$1,764 | 4 |
| 10.9 | Ash/Spent Sorbent Foundation | 1 | 22 | 29 | 2 | | \$54 | 4 | | 17 | \$76 | 0 |
| | SUBTOTAL 10. | \$3,726 | \$686 | \$3,177 | \$222 | | \$7,811 | \$625 | \$534 | \$1,039 | \$10,009 | 23 |
| | | | | | | | | | | | | |

14-Aug-98

11:02 AM

Report Date:

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98
Project: Market Based Advanced Coal Power Systems 11:02 AM
11:02 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2010-"H")

Plant Size: 427.7 MW net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| | Flailt Size. | 721.1 | ivivv ,i iet | Louis | iate Type. | Oonec | ptdai | | St base (Jan) | 1990 | (ΦΧ1000) | |
|------|--------------------------------|---|--------------|----------|------------|-------|---------------------|-----------|---------------|--------------|-------------|-------|
| Acct | | Equipment | Material | Lak | or | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | | | | - | | |
| 11.1 | Generator Equipment | 1,540 | | 245 | 17 | | \$1,802 | 144 | | 195 | \$2,141 | 5 |
| 11.2 | Station Service Equipment | 3,814 | | 314 | 22 | | \$4,150 | 332 | | 448 | \$4,930 | 12 |
| 11.3 | Switchgear & Motor Control | 3,040 | | 506 | 35 | | \$3,581 | 287 | | 580 | \$4,448 | 10 |
| 11.4 | Conduit & Cable Tray | , | 1,833 | 5,752 | 403 | | \$7,988 | 639 | | 1,725 | \$10,353 | 24 |
| 11.5 | Wire & Cable | | 1,968 | 1,965 | 138 | | \$4,071 | 326 | | 879 | \$5,276 | 12 |
| 11.6 | Protective Equipment | | 111 | 370 | 26 | | \$507 | 41 | | 82 | \$630 | 1 |
| 11.7 | Standby Equipment | 288 | | 6 | 0 | | \$295 | 24 | | 48 | \$367 | 1 |
| | Main Power Transformers | 3,701 | | 415 | 29 | | \$4,146 | 332 | | 672 | \$5,149 | 12 |
| 11.9 | Electrical Foundations | | 179 | 494 | 35 | | \$707 | 57 | | 229 | \$993 | 2 |
| | SUBTOTAL 11. | \$12,384 | \$4,091 | \$10,067 | \$705 | | \$27,247 | \$2,180 | | \$4,858 | \$34,285 | 80 |
| 12 | INSTRUMENTATION & CONTROL | . , | | | | | . , | . , | | | . , | |
| 12.1 | IGCC Control Equipment | | | | | | | | | | | |
| | Combustion Turbine Control | | | | | | | | | | | |
| 12.3 | Steam Turbine Control | | | | | | | | | | | |
| 12.4 | Other Major Component Control | 519 | | 317 | 22 | | \$858 | 69 | | 139 | \$1,065 | 2 |
| 12.5 | Signal Processing Equipment | W/12.7 | | w/12.7 | | | | | | | . , | |
| | Control Boards, Panels & Racks | 124 | | 73 | 5 | | \$202 | 16 | | 44 | \$262 | 1 |
| | Computer & Accessories | 4,961 | | 145 | 10 | | \$5,117 | 409 | | 553 | \$6,078 | 14 |
| | Instrument Wiring & Tubing | , , , , , | 1,548 | 4,811 | 337 | | \$6,696 | 536 | | 1,446 | \$8,678 | 20 |
| | Other I & C Equipment | 913 | , | 406 | 28 | | \$1,347 | 108 | | 146 | \$1,601 | 4 |
| | SUBTOTAL 12. | \$6,517 | \$1,548 | \$5,752 | \$403 | | \$14,220 | \$1,138 | | \$2,327 | \$17,685 | 41 |
| 13 | IMPROVEMENTS TO SITE | , | 4., | ¥-, | * | | * · · ·,== · | 4., | | - | 4.1,000 | |
| | Site Preparation | | 34 | 670 | 47 | | \$751 | 60 | | 243 | \$1,054 | 2 |
| | Site Improvements | | 1.119 | 1,382 | 97 | | \$2,598 | 208 | | 842 | \$3,647 | 9 |
| | Site Facilities | 2,006 | , - | 1,966 | 138 | | \$4,110 | 329 | | 1,332 | \$5,770 | 13 |
| | SUBTOTAL 13. | \$2,006 | \$1,153 | \$4,017 | \$281 | | \$7,458 | \$597 | | \$2,416 | \$10,471 | 24 |
| 14 | BUILDINGS & STRUCTURES | , | , , | . ,- | • | | , , | , | | • , | , , | |
| 14.1 | Combustion Turbine Area | | 223 | 141 | 10 | | \$374 | 30 | | 101 | \$504 | 1 |
| 14.2 | Steam Turbine Building | | 1,863 | 2,955 | 207 | | \$5,026 | 402 | | 1,357 | \$6,785 | 16 |
| 14.3 | Administration Building | | 449 | 363 | 25 | | \$837 | 67 | | 226 | \$1,131 | 3 |
| | Circulation Water Pumphouse | | 89 | 52 | 4 | | \$144 | 12 | | 39 | \$195 | 0 |
| | Water Treatment Buildings | | 560 | 609 | 43 | | \$1,211 | 97 | | 327 | \$1,635 | 4 |
| | Machine Shop | | 230 | 175 | 12 | | \$417 | 33 | | 113 | \$563 | 1 |
| | Warehouse | | 371 | 267 | 19 | | \$657 | 53 | | 177 | \$887 | 2 |
| | Other Buildings & Structures | | 222 | 193 | 13 | | \$429 | 34 | | 116 | \$579 | 1 |
| | Waste Treating Building & Str. | | 497 | 1,058 | 74 | | \$1,629 | 130 | | 440 | \$2,199 | 5 |
| | SUBTOTAL 14. | | \$4,505 | \$5,812 | \$407 | | \$10,724 | \$858 | | \$2,895 | \$14,477 | 34 |
| | | | | | | | | | | | | |
| | TOTAL COST | \$231,228 | \$27,045 | \$98,081 | \$6,866 | | \$363,220 | \$29,058 | \$14,258 | \$58,589 | \$465,125 | 1087 |
| | | | | | | | | | | | | |

| CONTINGENCY FACTORS Destec (2010-"H") | | | | | | | |
|--|--------------------------------|-------------------------------|--|--|--|--|--|
| Item/Description | Contingency <u>%Process</u> | Factors(%) <u>%Project</u> | | | | | |
| COAL & SORBENT HANDLING | | 20.0 | | | | | |
| COAL & SORBENT PREP & FEED | 3.4 | 13.2 | | | | | |
| FEEDWATER & MISC. BOP SYSTEMS | | 24.1 | | | | | |
| GASIFIER & ACCESSORIES | | | | | | | |
| Gasifier & Auxiliaries(Destec) | 10.0 | 10.0 | | | | | |
| High Temperature Cooling | 10.0 | 10.0 | | | | | |
| ASU/Oxidant Compression | | 10.0 | | | | | |
| Other Gasification Equipment | | 26.5 | | | | | |
| HOT GAS CLEANUP & PIPING | 11.8 | 20.4 | | | | | |
| COMBUSTION TURBINE/ACCESSORIES | | | | | | | |
| Combustion Turbine Generator | 7.5 | 10.0 | | | | | |
| Combustion Turbine Accessories | | 30.0 | | | | | |
| HRSG, DUCTING & STACK | | | | | | | |
| Heat Recovery Steam Generator | | 10.0 | | | | | |
| HRSG Accessories, Ductwork and Stack | | 13.9 | | | | | |
| STEAM TURBINE GENERATOR | | | | | | | |
| Steam TG & Accessories | | 10.0 | | | | | |
| Turbine Plant Auxiliaries and Steam Piping | | 17.2 | | | | | |
| COOLING WATER SYSTEM | | 18.0 | | | | | |
| ASH/SPENT SORBENT HANDLING SYS | 6.8 | 11.6 | | | | | |
| ACCESSORY ELECTRIC PLANT | | 16.5 | | | | | |
| INSTRUMENTATION & CONTROL | | 15.2 | | | | | |
| IMPROVEMENTS TO SITE | | 30.0 | | | | | |
| BUILDINGS & STRUCTURES | | 25.0 | | | | | |
| | | | | | | | |

| OPERATING LABOR REQUIREMENTS | | | | | | | | |
|--|---------------|--------------|--|--|--|--|--|--|
| Destec (2010-"H") | | | | | | | | |
| Operating Labor Rate(base): | 25.89 \$/hour | | | | | | | |
| Operating Labor Burden: | 30.00 % of ba | se | | | | | | |
| Labor O-H Charge Rate: 25.00 % of labor | | | | | | | | |
| Operating Labor Requirements(O.J.)per Shift: | | Total | | | | | | |
| Category | 1 unit/mod. | <u>Plant</u> | | | | | | |
| Skilled Operator | 2.0 | 2.0 | | | | | | |
| Operator | 10.0 | 10.0 | | | | | | |
| Foreman | 1.0 | 1.0 | | | | | | |
| Lab Tech's, etc. | <u>3.0</u> | <u>3.0</u> | | | | | | |
| TOTAL-O.J.'s | 16.0 | 16.0 | | | | | | |

| CONSUMABLES, BY-PRODUC | CTS & FUELS DATA | | |
|-------------------------------|------------------|--------|--------|
| Destec (2010-"H") | | | |
| | Consum | nption | Unit |
| Item/Description | <u>Initial</u> | /Day | _Cost_ |
| Water(/1000 gallons) | | 2,551 | 0.80 |
| Chemicals | | | |
| MU & WT Chem.(lbs) | 227,943 | 7,598 | 0.16 |
| Limestone (ton) | | | 16.25 |
| Z Sorb (ton)** | 24,430 | 814.3 | 3.50 |
| Nahcolite(ton) | 85 | 2.8 | 270.00 |
| Other Supplemental Fuel(MBtu) | | | |
| Gases,N2 etc.(/100scf) | | | 1.50 |
| L.P. Steam(/1000 pounds) | | | |
| Waste Disposal | | | |
| Sludge(ton) | | | |
| Slag(ton) | | 306 | 10.00 |
| By-products & Emissions | | | |
| Sulfuric Acid(pounds) | | 234 | 68.00 |
| | | | |
| Fuel(ton) | | 3,066 | 29.29 |

| MAINTENANCE FACTORS Destec (2010-"H") | |
|--|------------------|
| Item/Description | Maintenance % |
| COAL & SORBENT HANDLING | 2.0 |
| COAL & SORBENT PREP & FEED | 2.9 |
| FEEDWATER & MISC. BOP SYSTEMS | 1.9 |
| GASIFIER & ACCESSORIES | |
| Gasifier & Auxiliaries(Destec) | 5.0 |
| High Temperature Cooling | 4.5 |
| ASU/Oxidant Compression | 4.0 |
| Other Gasification Equipment | 0.8 |
| HOT GAS CLEANUP & PIPING | 4.4 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | 14.2 |
| Combustion Turbine Accessories | 0.5 |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | 2.0 |
| HRSG Accessories, Ductwork and Stack | 1.5 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 1.5 |
| Turbine Plant Auxiliaries and Steam Piping | 1.7 |
| COOLING WATER SYSTEM | 1.3 |
| ASH/SPENT SORBENT HANDLING SYS | 3.0 |
| ACCESSORY ELECTRIC PLANT | 1.5 |
| INSTRUMENTATION & CONTROL | 1.6 |
| IMPROVEMENTS TO SITE | 1.2 |
| BUILDINGS & STRUCTURES | 1.4 |



| CAPITAL INVESTMENT & | REVENUE RE | QUIREMEI | NT SUMMAR | RY | |
|--|---------------|---------------|------------------------|--------------|--------------|
| TITLE/DEFINITION | | | | | |
| Case: | 2gPFBCw/Bo | ost | | | |
| Plant Size: | | (MW,net) | HeatRate: | | (Btu/kWh) |
| Primary/Secondary Fuel(type): | Illnois #6 | , , | Cost: | | (\$/MMBtu) |
| Design/Construction: | | (years) | BookLife: TPI Year: | | (years) |
| TPC(Plant Cost) Year: Capacity Factor: | | (Jan.) (%) | i Pi rear. | 2005 | (Jan.) |
| Supulity Fuotor. | | (70) | | | |
| CAPITAL INVESTMENT | | | \$x1000 | | <u>\$/kW</u> |
| Process Capital & Facilities | | | 287,411 | | 758.0 |
| Engineering(incl.C.M.,H.O.& Fee) | | | 22,993 | | 60.6 |
| Process Contingency | | | 18,752 | | 49.5 |
| Project Contingency | | | 50,379 | | 132.9 |
| TOTAL PLANT COST(TPC) | | | \$379,535 | | 1000.9 |
| TOTAL CASH EXPENDED | | \$379,535 | ,, | | |
| AFDC | | \$23,376 | | | |
| TOTAL PLANT INVESTMENT(TPI) | | | \$402,911 | | 1062.6 |
| Boyolty Alloyango | | | | | |
| Royalty Allowance Preproduction Costs | | | 10,316 | | 27.2 |
| Inventory Capital | | | 3,459 | | 9.1 |
| Initial Catalyst & Chemicals(w/equip.) | | | 3, .55 | | 0 |
| Land Cost | | | 450 | | 1.2 |
| TOTAL CAPITAL REQUIREMENT(TCR |) | | \$417,135 | | 1100.1 |
| | | | | | |
| OPERATING & MAINTENANCE COSTS (1998 D | ollars) | | \$x1000 | | \$/kW-yr |
| Operating Labor | | | 3,538 | | 9.3 |
| Maintenance Labor | | | 3,200 | | 8.4 |
| Maintenance Material | | | 4,800 | | 12.7 |
| Administrative & Support Labor | | | 1,684 | | 4.4 |
| TOTAL OPERATION & MAINTENANCE | | | \$13,221 | | 34.9 |
| FIXED O & M | | | | 29.64 | \$/kW-yr |
| VARIABLE O & M | | | | 0.07 | ¢/kWh |
| CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars | s) | \$x1000 | | ¢/kWh |
| Water | ` | • | 733 | | 0.03 |
| Chemicals | | | 2,862 | | 0.10 |
| Other Consumables | | | 0.040 | | 0.00 |
| Waste Disposal | | | 2,340 | | 0.08 |
| TOTAL CONSUMABLE OPERATING C | OSTS | | \$5,936 | | 0.21 |
| BY-PRODUCT CREDITS (1998 Dollars) | | | | | |
| FUEL COST (1998 Dollars) | | | \$25,760 | | 0.91 |
| | 1st Year | (2005 \$) | Leveli | ized (10th.) | ear \$) |
| PRODUCTION COST SUMMARY | | ¢/kWh | | ¢/kWh | • |
| Fixed O & M | 29.6/kW-yr | 0.40 | 29.6/kW-yr | 0.40 | |
| Variable O & M | | 0.07 | | 0.07 | |
| Consumables By product Credit | | 0.21 | | 0.21 | |
| By-product Credit Fuel | | 0.83 | | 0.79 | |
| TOTAL PRODUCTION COST | | 1.51 | - | 1.46 | |
| LEVELIZED CARRYING CHARGES(Capital) | | | 148.5/kW-yr | 1.99 | |
| LEVELIZED (10th.Year) BUSBAR COST OF PO | WER | | | 3.46 | |
| | | | | J. 10 | |

| ESTIMATE BASIS/FINANCIAL CRIT | RIA for REVENUE REC | UIREMENT | CALCULATIONS |
|---|---------------------|---|------------------------|
| GENERAL DATA/CHARACTERISTICS | | | |
| Case Title: | 2gPFBC | w/Boost | |
| Unit Size:/Plant Size: | 37 | 9.2 MW,net | 379.2 MWe |
| Location: | Middleto | wn, USA | |
| Fuel: Primary/Secondary | Illnois #6 | 6 | |
| Energy From Primary/Secondary Fuels | 7,2 | 269 Btu/kWh | n Btu/kWh |
| Levelized Capacity Factor / Preproduction(equiv | alent months): | 85 % | 1 months |
| Capital Cost Year Dollars (Reference Year Doll | rs): 19 | 998 (January | y) |
| Delivered Cost of Primary/Secondary Fuel | 1 | .26 \$/MBtu | \$/MBtu |
| Design/Construction Period: | | 3 years | |
| Plant Startup Date (1st. Year Dollars): | 20 | 005 (January | y) |
| Land Area/Unit Cost | 3 | 300 acre | \$1,500 /acre |
| FINANCIAL CRITERIA | | | |
| Project Book Life: | | 20 years | |
| Book Salvage Value: | | % | |
| Project Tax Life: | | 20 years | |
| Tax Depreciation Method: | Accel. b | ased on ACF | RS Class |
| Property Tax Rate: | | 1.0 % per ye | ear |
| Insurance Tax Rate: | | 1.0 % per ye | ear |
| Federal Income Tax Rate: | 3 | 4.0 % | |
| State Income Tax Rate: | | 6.0 % | |
| Investment Tax Credit/% Eligible | | % | % |
| Economic Basis: | 10th.Y | ear Constan | nt Dollars |
| Capital Structure Common Equity Preferred Stock | _% of To | 20 | <u>Cost(%)</u> 16.5 |
| Debt Weighted Cost of Capital:(after tax) | | 80 | 5.8 6.2 % |
| Escalation Rates | | ok Life % per ye 1.1 % per ye 1.2 % per ye | ear -1.36 % per year |

Client: DEPARTMENT OF ENERGY 14-Aug-98 Report Date: Project: Market Based Advanced Coal Power Systems 10:52 AM

TOTAL PLANT COST SUMMARY

Case:

2gPFBCw/Boost 379.2 MW,net Plant Size: Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

| | 1 | | | | | | | | | | | |
|-------------|---|-------------------|----------------|-----------------------|-----------------|--------------|-------------------------|-----------------------|--------------------|-------------------|---------------------|-----------|
| Acct No. | Item/Description | Equipment Cost | Material Cost | Lat Direct | oor Indirect | Sales Tax | Bare Erected Cost \$ | Eng'g CM H.O.& Fee | Conting Process | encies Project | TOTAL PLANT | \$/kW |
| NO. | item/Description | Cost | Cost | Direct | indirect | тах | Cost \$ | H.U.& Fee | Process | Project | \$ | \$/KVV |
| 1 | COAL & SORBENT HANDLING | 7,538 | 1,270 | 3,245 | 227 | | \$12,280 | 982 | | 2,794 | \$16,056 | 42 |
| 2 | COAL & SORBENT PREP & FEED | 12,633 | 1,254 | 2,838 | 199 | | \$16,924 | 1,354 | 609 | 2,596 | \$21,483 | 57 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 6,107 | 3,212 | 4,799 | 336 | | \$14,453 | 1,156 | | 3,709 | \$19,319 | 51 |
| 4 | CARBONIZER, PFBC & PFB HTX PFB PRESSURE VESSEL | 3,031 | | 448 | 31 | | \$3,510 | 281 | 526 | 432 | \$4,749 | 13 |
| | PFBC Boiler | 1,672 | | 357 | 25 | | \$2,055 | 164 | 308 | 432 253 | \$4,749 \$2,780 | 7 |
| | PFBC Economizer | 24,307 | | 4.599 | 322 | | \$2,033 | 2,338 | 4.384 | 3.595 | \$39,544 | 104 |
| | Other PFBC Equipment | 1,092 | 6,241 | 4.082 | 286 | | \$11,701 | 936 | 68 | 2,566 | \$15,272 | 40 |
| 1.1 1.0 | SUBTOTAL 4 | 30,102 | 6,241 | 9,486 | 664 | | \$46,493 | 3,719 | 5,287 | 6,845 | \$62,345 | 164 |
| 5 | HOT GAS CLEANUP & PIPING | 15,015 | 4,968 | 4,582 | 321 | | \$24,886 | 1,991 | 4,270 | 6,259 | \$37,405 | 99 |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | | | | | | | | | 4== 4== | 400 |
| | Combustion Turbine Generator | 50,976 | 4.040 | 2,820 | 197 | | \$53,994 | 4,319 | 8,099 | 6,641 | \$73,053 | 193 |
| 6.2-6.9 | C.T. Booster Air System & BOA SUBTOTAL 6 | 785 51,762 | 1,018 1.018 | 1,141 <i>3,960</i> | 69 267 | | \$3,013 \$57,006 | 241 <i>4.561</i> | 8.099 | 707 7,348 | \$3,961 \$77,014 | 10 203 |
| _ | | 31,702 | 1,016 | 3,900 | 207 | | \$37,000 | 4,501 | 0,099 | 7,340 | φ//,014 | 203 |
| 7 | HRSG, DUCTING & STACK Heat Recovery Steam Generator | 7,241 | | 927 | 65 | | \$8,233 | 659 | | 889 | \$9,781 | 26 |
| | HRSG Accessories, Ductwork and Stack | 1,528 | 611 | 1,136 | 80 | | \$3,355 | 268 | | 513 | | 11 |
| 1.2-1.5 | SUBTOTAL 7 | 8,769 | 611 | 2,063 | 144 | | \$11,588 | 927 | | 1,402 | \$13,917 | 37 |
| 8 | STEAM TURBINE GENERATOR | | | | | | | | | | | |
| | Steam TG & Accessories | 17,120 | | 2,666 | 187 | | \$19,972 | 1,598 | | 2,157 | \$23,727 | 63 |
| 8.2-8.9 | Turbine Plant Auxiliaries and Steam Piping | | 4,169 | 3,254 | 228 | | \$10,339 | 827 | | 1,874 | \$13,039 | 34 |
| | SUBTOTAL 8 | 19,807 | 4,169 | 5,920 | 414 | | \$30,311 | 2,425 | | 4,031 | \$36,767 | 97 |
| 9 | COOLING WATER SYSTEM | 4,286 | 2,498 | 4,325 | 303 | | \$11,411 | 913 | | 2,237 | \$14,561 | 38 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | 6,504 | 1,192 | 1,531 | 107 | | \$9,334 | 747 | 486 | 1,580 | \$12,147 | 32 |
| 11 | ACCESSORY ELECTRIC PLANT | 9,721 | 2,715 | 6,934 | 485 | | \$19,855 | 1,588 | | 3,503 | \$24,946 | 66 |
| 12 | INSTRUMENTATION & CONTROL | 5,319 | 1,439 | 5,507 | 385 | | \$12,650 | 1,012 | | 2,121 | \$15,783 | 42 |
| 13 | IMPROVEMENTS TO SITE | | 3,349 | 5,430 | 380 | | \$9,159 | 733 | | 2,967 | \$12,859 | 34 |
| 14 | BUILDINGS & STRUCTURES | | 4,635 | 6,006 | 420 | | \$11,061 | 885 | | 2,986 | \$14,932 | 39 |
| | TOTAL COST | \$177,562 | \$38,572 | \$66,624 | \$4,653 | | \$287,411 | \$22,993 | \$18,752 | \$50,379 | \$379,535 | 1001 |

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98 10:52 AM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

2gPFBCw/Boost 379.2 MW,net Case:

Plant Size: Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| Acct | | Equipment | Material | Lab | or | Sales | Bare Erected | Eng'a CM | Contino | encies | TOTAL PLANT | COST |
|------|--------------------------------|---------------------------------------|----------|-------------|----------|-------|--|-----------|---------|-----------------|-------------|---|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | | | | | | 000.0 | | | , | Ť | 4,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
| 1.1 | Coal Receive & Unload | 1.448 | | 797 | 56 | | \$2,300 | 184 | | 497 | \$2.981 | 8 |
| | Coal Stackout & Reclaim | 1,871 | | 511 | 36 | | \$2,417 | 193 | | 522 | \$3,133 | 8 |
| | Coal Conveyors & Yd Crush | 1.739 | | 505 | 35 | | \$2,280 | 182 | | 492 | \$2,955 | 8 |
| | Other Coal Handling | 455 | | 117 | 8 | | \$580 | 46 | | 125 | \$752 | 2 |
| | Sorbent Receive & Unload | 57 | | 21 | ī | | \$79 | 6 | | 21 | \$106 | 0 |
| 1.6 | Sorbent Stackout & Reclaim | 914 | | 202 | 14 | | \$1,130 | 90 | | 305 | \$1,525 | 4 |
| | Sorbent Conveyors | 755 | 66 | 198 | 14 | | \$1,032 | 83 | | 279 | \$1,394 | 4 |
| | Other Sorbent Handling | 197 | 43 | 124 | 9 | | \$373 | 30 | | 101 | \$504 | 1 |
| | Coal & Sorbent Hnd.Foundations | 104 | 1.160 | 771 | 54 | | \$2,089 | 167 | | 451 | \$2,707 | 7 |
| | SUBTOTAL 1. | | \$1,270 | \$3,245 | \$227 | | \$12,280 | \$982 | | \$2,794 | \$16,056 | 42 |
| 2 | COAL & SORBENT PREP & FEED | 41,000 | * - ,= | 4 -, | * | | * · · · · · · · · · · · · · · · · · · · | | | * -, | 410,000 | |
| | Coal Crushing & Drying | 631 | 98 | 364 | 26 | | \$1.119 | 90 | | 242 | \$1,450 | 4 |
| | Coal Conveyor / Storage | 217 | 49 | 38 | 3 | | \$307 | 25 | | 66 | \$397 | 1 |
| | Coal Injection System | 8,205 | 106 | 835 | 58 | | \$9,204 | 736 | 460 | 1,040 | \$11,440 | 30 |
| | Misc.Coal Prep & Feed | 184 | 126 | 453 | 32 | | \$794 | 64 | | 172 | \$1.029 | 3 |
| 2.5 | | 410 | 36 | 165 | 12 | | \$623 | 50 | | 135 | \$807 | 2 |
| | Sorbent Storage & Feed | 108 | | 25 | 2 | | \$134 | 11 | | 36 | \$181 | 0 |
| | | 2,701 | 35 | 231 | 16 | | \$2,982 | 239 | 149 | 505 | \$3,875 | 10 |
| | Booster Air Supply System | 178 | 83 | 109 | 8 | | \$377 | 30 | | 102 | \$510 | 1 |
| | Coal & Sorbent Feed Foundation | | 722 | 618 | 43 | | \$1,383 | 111 | | 299 | \$1,792 | 5 |
| | SUBTOTAL 2. | \$12.633 | \$1,254 | \$2,838 | \$199 | | \$16,924 | \$1,354 | \$609 | \$2,596 | \$21,483 | 57 |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | • , - | , , | • | | , ,,, | , , | • | , , , | , , , , , | - |
| 3.1 | FeedwaterSystem | 981 | 1.908 | 1,018 | 71 | | \$3,978 | 318 | | 859 | \$5,156 | 14 |
| | Water Makeup & Pretreating | 418 | 44 | 240 | 17 | | \$719 | 57 | | 233 | \$1,009 | 3 |
| | Other Feedwater Subsystems | 584 | 218 | 198 | 14 | | \$1.014 | 81 | | 219 | \$1,315 | 3 |
| 3.4 | Service Water Systems | 32 | 69 | 242 | 17 | | \$360 | 29 | | 117 | \$506 | 1 |
| | Other Boiler Plant Systems | 1,366 | 551 | 1.381 | 97 | | \$3,395 | 272 | | 733 | \$4,400 | 12 |
| | FO Supply Sys & Nat Gas | 94 | 178 | 335 | 23 | | \$630 | 50 | | 136 | \$817 | 2 |
| | Waste Treatment Equipment | 830 | | 486 | 34 | | \$1,351 | 108 | | 438 | \$1.897 | 5 |
| 3.8 | Misc. Power Plant Equipment | 1,802 | 244 | 898 | 63 | | \$3,006 | 240 | | 974 | \$4,220 | 11 |
| | SUBTOTAL 3. | \$6,107 | \$3,212 | \$4,799 | \$336 | | \$14,453 | \$1,156 | | \$3,709 | \$19,319 | 51 |
| 4 | CARBONIZER, PFBC & PFB HTX | | , | , , | • | | , , | , , | | , | , ,,, | - |
| 4.1 | PFB PRESSURE VESSEL | 3,031 | | 448 | 31 | | \$3,510 | 281 | 526 | 432 | \$4,749 | 13 |
| 4.2 | PFBC Boiler | 1,672 | | 357 | 25 | | \$2,055 | 164 | 308 | 253 | \$2,780 | 7 |
| | PFBC Economizer | 24,307 | | 4.599 | 322 | | \$29.227 | 2.338 | 4.384 | 3.595 | \$39.544 | 104 |
| 4.4 | Interconnecting Pipe | | 1,467 | 939 | 66 | | \$2,472 | 198 | ., | 400 | \$3,070 | 8 |
| | Misc. PFBC Equipment | 392 | • | 58 | 4 | | \$454 | 36 | 68 | 84 | \$643 | 2 |
| | Other PFBC Equipment | 699 | 680 | 480 | 34 | | \$1,894 | 151 | | 205 | \$2,250 | 6 |
| | Major Component Rigging | | 1,218 | 894 | 63 | | \$2,175 | 174 | | 352 | \$2,701 | 7 |
| | PFBC Structure/Foundation | 1 | 2,876 | 1,711 | 120 | | \$4,707 | 377 | | 1,525 | \$6,608 | 17 |
| | SUBTOTAL 4. | \$30,102 | \$6,241 | \$9,486 | \$664 | | \$46,493 | \$3,719 | \$5,287 | \$6,845 | \$62,345 | 164 |

Client: DEPARTMENT OF ENERGY

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Case: 2gPFBCw/Boost

Plant Size: 379.2 MW,net Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| Acet No. Item/Description Equipment Material Direct Indirect Tax Cost \$ HO. & Fee Projects No. ToOst No. ToOst No. | | | | , | | | | F | | | | (*/ | |
|---|------|--------------------------------|-----------|---------------------|---------|-------------------|-------|---------------------|-----------|---------|----------------------|---------------|-------|
| No. | Acct | | Equipment | Material | Lab | or | Sales | Bare Erected | Eng'g CM | Conting | encies | TOTAL PLANT | COST |
| 5.1 Barrier Filters 5,064 533 37 \$5,625 450 1,406 1,496 88,977 24 52 Primary A Secondary Cyclones 7,642 781 55 88,476 678 2,119 2,255 513,531 34 55. Primary A Secondary Cyclones 7,642 781 55 88,476 678 2,119 2,255 513,531 34 55. Primary A Secondary Cyclones 7,642 781 55 88,476 678 2,119 2,255 513,531 34 55. Primary A Secondary Cyclones 7,642 781 55 88,476 87,534 603 1,627 83,764 26 54. Primary A Secondary Cyclones 8,600 481 55. Primary Cyclones | No. | Item/Description | | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 5.1 Barrier Filters 5,064 533 37 \$5,625 450 1,406 1,496 88,977 24 52 Primary A Secondary Cyclones 7,642 781 55 88,476 678 2,119 2,255 513,531 34 55. Primary A Secondary Cyclones 7,642 781 55 88,476 678 2,119 2,255 513,531 34 55. Primary A Secondary Cyclones 7,642 781 55 88,476 678 2,119 2,255 513,531 34 55. Primary A Secondary Cyclones 7,642 781 55 88,476 87,534 603 1,627 83,764 26 54. Primary A Secondary Cyclones 8,600 481 55. Primary Cyclones | | | | | | | | | | | | | |
| 5.2 Primary & Secondary Cyclones 5.3 Hot Gas Piping 4.355 2.973 208 5.5 Hot Gas Air Systems 2.318 413 230 16 \$2.977 238 744 792 \$4.751 13 \$5.5 Bag House & Accessories 5.6 Other BH 5.5 Bag House & Accessories 6.1 Combustion Turbine Foundations 5.5 Bag House & Accessories 5.5 Ba | 5 | HOT GAS CLEANUP & PIPING | | | | | | | | | | | |
| 5.3 Hor Gas Piping 5.5 Hor Gas Vas Kar Systems 5.6 Hor Bland South State 5.6 Other BH 5.9 HCCU Foundations 6. Combustion Turbine Generator 6.1 Combustion Turbine Foundations 7.70 HRSG, Cocessories 7.3 Ductwork 7.1 Heat Recovery Steam Generator 7.2 HRSG, Cocessories 7.3 Ductwork 7.4 HSG, Duct & Stack Foundations 8.1 Local Stack Foundations 8.1 Local Stack Foundations 8.1 Local Stack Foundations 8.1 Stam TG & Accessories 9.1 Combustion Turbine Generator 7.3 Ductwork 7.4 HSG, Duct & Stack Foundations 8.1 Stam TG & Accessories 9.3 TEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 1.1 Stam TG & Accessories 1.1 Stam TG & Accessories 1.1 Combustion Turbine Generator 7.2 HRSG, Cocessories 7.3 Ductwork 8.1 Steam TG & Accessories 9.3 Ductwork 8.2 Stam TG & Accessories 9.4 Jan State 1.1 Stam TG & Accessories 1.2 Jan State 1.1 Stam TG & Accessories 1.2 Jan State 1.1 Stam TG & Accessories 1.2 Jan State 1.2 Jan State 1.2 Jan State 1.2 Jan State 1.3 Stam TG & Accessories 1.4 Jan State 1.5 Jan State 1. | | | 5,054 | | | | | \$5,625 | | | | | |
| 5.4 Blowback Gas & Air Systems 5.6 Other BH 5.5 Bag House & Accessories 6.1 Combustion Turbine Generator 5.0,976 \$4,968 \$4,982 \$321 \$22 \$88 \$3,82 \$1 \$24,886 \$1,991 \$4,270 \$6,259 \$37,405 \$99 \$32,605 \$1,000 \$ | 5.2 | Primary & Secondary Cyclones | 7,642 | | 781 | 55 | | | | 2,119 | | | |
| 5.5 Bag House & Accessories 5.6 Other BH 5.9 HGCU Foundations WIBTOTAL 5. 6 COMBUSTION TURBINE/ACCESSORIES 6.1 Combustion Turbine Generator 6.2 CT. Booster Air System & BOA 7 RES. DUCTING & STACK 7 HESG Accessories 7 HRSG, DUCTING & STACK 7.2 HRSG, Duct & Stack Foundations 8 STACK 8 STACK 8 STACK 8 STACK 8 STACK 8 STACK 9 STACK 8 S | | | | | | | | | | | | | - 1 |
| 5.9 HGCU Foundations SUBTOTAL 5. \$15,015 \$4,968 \$4,582 \$321 \$24,866 \$1,991 \$4,270 \$6,259 \$37,405 \$99 \$6 \$COMBUSTION TURBINE/ACCESSORIES \$165 \$15,015 \$4,968 \$4,582 \$321 \$24,866 \$1,991 \$4,270 \$6,259 \$37,405 \$99 \$6.2 C.T. Booster Air System & BOA \$785 \$185 \$152 \$152 \$1,122 \$90 \$4,369 \$6,641 \$73,053 \$193 \$4,630 \$6,900 \$6,641 \$73,053 \$193 \$4,630 \$6,900 \$6,641 \$73,053 \$193 \$4,630 \$6,90 | | | 2,318 | 413 | 230 | 16 | | \$2,977 | 238 | 744 | 792 | \$4,751 | 13 |
| Substant | | | | | | | | | | | | | |
| SUBTOTAL 5 | | | | | | | | | | | | | |
| 6 COMBUSTION TURBINE/ACCESSORIES 6.1 Combustion Turbine Generator 6.2 C.T. Booster Air System & BOA 6.3 Compressed Air Piping 6.9 Combustion Turbine Foundations 7 HSG, DUCTING & STACK 7.4 HSG Accessories 7.2 HSG Accessories 7.3 District Response of the Piping 8.1 Subtotal T. Subtot | 5.9 | | | | | | | | | | | | |
| 6.1 Combustion Turbine Generator | | | | \$4,968 | \$4,582 | \$321 | | \$24,886 | \$1,991 | \$4,270 | \$6,259 | \$37,405 | 99 |
| 6.2 C.T. Booster Air System & BOA 6.3 Compressed Air Piping 710 846 59 \$1,616 129 436 \$2,181 6 6.9 Combustion Turbine Foundations \$123 142 10 \$275 22 89 \$386 1 1 \$394 20 \$386 1 \$1 \$3960 \$182 \$1,616 129 \$436 \$2,181 6 6.9 \$386 1 1 \$3960 \$182 \$1,616 \$1 29 \$1,316 \$2 \$1,015 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 | | | | | | | | | | | | | |
| 6.3 Compressed Air Piping 6.9 Combustion Turbine Foundations 123 142 10 \$275 22 89 \$3.886 1 \$2.181 6.9 \$3.000 \$2.75 \$1.018 \$3.960 \$2.67 \$57,006 \$4.561 \$8.099 \$7,348 \$77,014 \$203 \$7.000 \$1.000 | | | | | | 197 | | , | , , , , | 8,099 | -,- | | |
| 6.9 Combustion Turbrine Foundations 123 142 10 \$275 22 89 \$386 1 | | | 785 | | | | | | | | | | |
| New Note | | | | | | | | | | | | | - 1 |
| RRSG, DUCTING & STACK | 6.9 | | ^ | | | | | | | ** *** | | | |
| 7.1 Heat Recovery Steam Generator 7,241 9,27 65 \$8,233 659 889 \$9,781 26 7.2 HRSG Accessories 7.3 Ductwork | - | | \$51,762 | \$1,018 | \$3,960 | \$267 | | \$57,006 | \$4,561 | \$8,099 | \$7,348 | \$77,014 | 203 |
| 7.2 HRSG Accessories 7.3 Ductwork 7.3 Ductwork 7.4 Stack 7.9 HRSG, Duct & Stack Foundations SUBTOTAL 7. 8 STEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 8.2 Turbine Plant Auxiliaries 8.3 Condenser & Auxiliaries 8.3 Condenser & Auxiliaries 8.4 Steam Piping 8.5 Steam TG & Accessories 8.5 Turbine Plant Auxiliaries 8.6 Turbine Plant Auxiliaries 8.7 STEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 8.2 Turbine Plant Auxiliaries 8.3 Condenser & Auxiliaries 8.4 Steam Piping 8.5 Steam TG & Accessories 8.6 Turbine Plant Auxiliaries 8.6 Turbine Plant Auxiliaries 8.7 Steam TG & Accessories 8.7 Steam TG & Accessories 8.8 Steam TG & Accessories 8.9 To Foundations 8.0 Subtotal 8. 8 Steam Piping 8 Steam TG & Accessories 8 Steam Piping 9 Subtotal 8. 8 Steam TG & Accessories 9 Coolling Water System 9 Coolling Water Pumps 9 Subtotal 8. 9 Coirculating Water Pumps 9 Steam Auxiliaries 9 Steam TG & Auxiliaries 9 Steam TG & Auxiliaries 10 Steam TG & Steam T | | | | | | | | | | | | 00.704 | |
| 7.3 Ductwork 7.4 Stack 7.4 Stack 7.5 | | | 7,241 | | 927 | 65 | | \$8,233 | 659 | | 889 | \$9,781 | 26 |
| 7.4 Stack 7.9 HRSG,Duct & Stack Foundations SUBTOTAL 7. \$8,769 \$611 \$2,063 \$144 \$11,588 \$927 \$1,402 \$13,971 \$37 \$8 \$37 \$11,588 \$927 \$1,402 \$13,971 \$37 \$8 \$37 \$11,588 \$927 \$1,402 \$13,971 \$37 \$8 \$37 \$14,588 \$927 \$1,402 \$13,971 \$37 \$8 \$37 \$14,002 \$13,971 \$37 \$38,769 \$611 \$2,063 \$144 \$11,588 \$927 \$1,402 \$13,971 \$37 \$38,769 \$611 \$2,066 \$187 \$11,588 \$927 \$1,402 \$13,971 \$37 \$38,769 \$611 \$2,066 \$187 \$11,588 \$927 \$1,402 \$13,971 \$37 \$38,712 \$13,972 \$1,598 \$2,157 \$23,727 \$63 \$8.2 Turbine Plant Auxiliaries \$100 \$233 \$16 \$350 \$28 \$38 \$416 \$1 \$38,30 \$38,416 \$1 \$38,30 \$38,416 \$1 \$38,462 \$277 \$374 \$4,112 \$11 \$38,47 \$38,462 \$277 \$374 \$4,112 \$11 \$38,47 \$38,462 \$277 \$374 \$4,112 \$11 \$38,47 \$38,462 \$277 \$374 \$4,112 \$11 \$38,47 \$38,462 \$277 \$374 \$4,112 \$11 \$38,47 \$38,462 \$277 \$38,462 \$38,47 | | | | 500 | 45.4 | 00 | | 04.045 | | | 040 | 04.040 | |
| 7.9 HRSG,Duct & Stack Foundations 82 101 7 \$190 15 62 \$267 1 8 STEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 17,120 2,666 187 \$19,972 1,598 2,157 \$23,727 63 8.2 Turbine Plant Auxiliaries 100 233 16 \$350 28 38 \$416 1 8.3 Condenser & Auxiliaries 2,687 724 51 \$3,462 277 374 \$4,112 11 8.9 TG Foundations SUBTOTAL 8. \$19,807 \$4,169 \$5,920 \$414 \$30,311 \$2,425 \$4,031 \$36,767 97 9 COOLING WATER SYSTEM \$19,807 \$4,169 \$5,920 \$414 \$30,311 \$2,425 \$4,031 \$36,767 97 9.1 Cooling Towers 3,280 781 55 \$4,116 329 444 \$4,889 13 9.2 Circulating Water Pumps 517 50 4 \$570 46 62 \$678 2 | | | 4 500 | 529 | | | | | | | | | |
| SUBTOTAL 7. \$8,769 \$611 \$2,063 \$144 \$11,588 \$927 \$1,402 \$13,917 \$37 \$8 \$1.5 | | | 1,528 | 00 | | | | | l | | | | |
| 8 STEAM TURBINE GENERATOR 8.1 Steam TG & Accessories 17,120 2,666 187 8.2 Turbine Plant Auxiliaries 100 233 16 \$3550 28 38 \$416 1 8.3 Condenser & Auxiliaries 2,687 724 51 \$3,462 277 374 \$4,112 11 8.4 Steam Piping Port Subtotal 8. 9 TG Foundations 9 COOLING WATER SYSTEM 9.1 Cooling Towers 9.2 Circulating Water Pumps 517 50 40 517 50 40 517 50 518 518 519 517 50 40 517 50 518 518 518 518 518 518 518 518 518 518 | 7.9 | | ¢0.700 | | | • | | | | | | | |
| 8.1 Steam TG & Accessories 17,120 2,666 187 \$19,972 1,598 2,157 \$23,727 63 8.2 Turbine Plant Auxiliaries 100 233 16 \$350 28 38 \$416 1 8.3 Condenser & Auxiliaries 2,687 724 51 \$3,462 277 374 \$4,112 11 8.4 Steam Piping 3,864 2,036 142 \$6,042 483 1,305 \$7,831 21 8.9 TG Foundations SUBTOTAL 8. \$19,807 \$4,169 \$5,920 \$414 \$30,311 \$2,425 \$40,31 \$36,676 97 9 COOLING WATER SYSTEM 3,280 781 55 \$4,116 329 444 \$4,889 13 9.1 Cooling Towers 3,280 781 55 \$4,116 329 444 \$4,889 13 9.2 Circulating Water Pumps 517 50 4 \$570 46 62 \$678 2 9.3 Circ.Water System Auxiliaries 64 9 <td< td=""><td>0</td><td></td><td>\$8,769</td><td>\$611</td><td>\$2,063</td><td>\$144</td><td></td><td>\$11,588</td><td>\$927</td><td></td><td>\$1,402</td><td>\$13,917</td><td>31</td></td<> | 0 | | \$8,769 | \$611 | \$2,063 | \$144 | | \$11,588 | \$927 | | \$1,402 | \$13,917 | 31 |
| 8.2 Turbine Plant Auxiliaries 100 233 16 \$350 28 38 \$416 1 8.3 Condenser & Auxiliaries 2,687 724 51 \$3,462 277 374 \$4,112 11 8.4 Steam Piping 3,864 2,036 142 \$6,042 483 1,305 \$7,831 21 8.9 TG Foundations SUBTOTAL 8. \$19,807 \$4,169 \$5,920 \$414 \$30,311 \$2,425 \$4,031 \$36,677 97 9 COOLING WATER SYSTEM \$19,807 \$4,169 \$5,920 \$414 \$30,311 \$2,425 \$4,031 \$36,677 97 9.1 Cooling Towers 3,280 781 55 \$4,116 329 444 \$4,889 13 9.2 Circulating Water Pumps 517 50 4 \$570 46 62 \$678 2 9.3 Circ.Water System Auxiliaries 64 9 1 \$74 6 8 \$87 0 9.5 Make-up Water System Auxiliaries 64 | | | 17 120 | | 2 666 | 107 | | ¢10.072 | 1 500 | | 2 157 | ¢22 727 | 62 |
| 8.3 Condenser & Auxiliaries 8.4 Steam Piping 8.9 TG Foundations SUBTOTAL 8. \$19,807 \$4,169 \$5,920 \$414 \$30,311 \$2,425 \$4,031 \$36,677 97 \$79 \$10.00 Cooling Towers 3.280 781 55 \$4,116 329 444 \$4,889 13 9.2 Circulating Water Pumps 517 50 4 \$570 46 62 \$678 2 9.3 Circ. Water System Auxiliaries 64 9 1 1,244 1,398 98 \$2,740 219 592 \$3,550 9 9.5 Make-up Water System 9.0 Coopenent Cooling Water Sys 9.0 Circ. Water System 143 214 15 \$371 30 80 \$481 1 9.9 Circ. Water System Foundations 916 1,623 114 \$2,652 212 859 \$3,724 10 \$30.31 \$30.3 \$10.7 Ash Transport & Feed Equipment 1565 142 10 \$717 57 116 \$891 2 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$155 0 | | | 17,120 | 100 | | | | | | | | | |
| 8.4 Steam Piping 8.9 TG Foundations SUBTOTAL 8. \$19,807 \$4,169 \$5,920 \$414 \$30,311 \$30,55 \$7,831 21 9 COOLING WATER SYSTEM 9.1 Cooling Towers 9.2 Circulating Water Pumps 10.5 Circ. Water Piping 10.5 Component Cooling Water System 11.43 21.44 1,398 98 \$2,740 219 592 \$3,550 9 9.5 Make-up Water System 11.43 214 15 \$371 30 80 \$411 1 9.6 Component Cooling Water System 11.43 214 15 \$371 30 80 \$411 1 9.6 Component Cooling Water System 11.43 214 15 \$371 30 80 \$411 1 9.6 Component Cooling Water System 11.43 214 15 \$371 30 80 \$411 1 9.6 Component Cooling Water System 11.43 214 15 \$371 30 80 \$411 1 9.6 Component Cooling Water System 11.43 214 15 \$371 30 80 \$411 1 9.6 Component Cooling Water System 50 \$41.85 \$371 \$411 \$411 \$41.85 | | | 0.607 | 100 | | | | | | | | | |
| 8.9 TG Foundations SUBTOTAL 8. 9 COOLING WATER SYSTEM 9.1 Cooling Towers 9.2 Circulating Water Pumps 517 508 448 944 5570 46 62 568 29 3,280 781 55 54,116 329 444 \$4,889 13 9.2 Circulating Water Pumps 64 9 1 574 6 8 8,877 9 9.5 Make-up Water System 9.6 Component Cooling Water Sys 9.9 Circ. Water System Foundations 9.0 Circ. Water System Foundations 9.1 Cooling Towers 1,244 1,398 9.2 Circulating Water Pumps 64 9 1 1,244 1,398 9.3 Significant System 143 214 15 5371 30 80 481 1 9.6 Component Cooling Water Sys 9.7 Circ. Water System Foundations 916 1,623 114 52,652 122 859 \$3,724 101 ASH/SPENT SORBENT HANDLING SYS 10.1 Ash Coolers 10.2 Ash Letdown 11,546 8 36 2 \$1,592 127 159 282 \$2,160 6 10.3 HGCU Ash Depressurization 11,546 8 36 2 \$1,592 127 159 282 \$2,160 6 10.3 HGCU Ash Depressurization 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 434 477 33 494 76 153 \$1,173 3 10.7 Ash Transport & Feed Equipment 10.8 Misc. Ash Handling Equipment 899 1,101 333 23 \$2,356 188 382 \$2,226 8 8 8 8 7 29 \$157 \$4,031 \$36,767 97 84,489 13 \$36,767 97 84,489 13 \$30,311 \$2,425 \$4,031 \$30,97 444 \$4,489 13 329 444 \$4,489 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 \$4,4889 13 329 444 45,4889 13 329 444 45,116 8888 71 11,111 8913 891 891 891 891 891 891 | | | 2,007 | 2 964 | | | | | | | | | |
| SUBTOTAL 8. \$19,807 \$4,169 \$5,920 \$414 \$30,311 \$2,425 \$4,031 \$36,767 97 | | | | | | | | | | | | | |
| 9 COOLING WATER SYSTEM 9.1 Cooling Towers 3,280 781 55 \$4,116 329 444 \$4,889 13 9.2 Circulating Water Pumps 517 50 4 \$570 46 62 \$678 2 9.3 Circ. Water System Auxiliaries 64 9 1 \$74 6 8 \$887 0 9.4 Circ. Water Piping 1,244 1,398 98 \$2,740 219 592 \$3,550 9 9.5 Make-up Water System 143 214 15 \$371 30 80 \$481 1 9.6 Component Cooling Water Sys 283 338 250 18 \$888 71 192 \$1,151 3 9.9 Circ. Water System Foundations 916 1,623 114 \$2,652 212 859 \$3,724 10 SUBTOTAL 9. \$4,286 \$2,498 \$4,325 \$303 \$11,411 \$913 \$2,237 \$14,561 38 10. ASH/SPENT SORBENT HANDLING SYS 10.1 Ash Coolers W10.2&10.3 341 24 \$364 29 39 \$433 1 10.2 Ash Letdown 1,546 8 36 2 \$1,592 127 159 282 \$2,160 6 10.3 HGCU Ash Depressurization 3,060 46 154 11 \$3,271 262 327 579 \$4,439 12 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 434 477 33 \$944 76 153 \$1,173 3 10.7 Ash Transport & Feed Equipment 565 142 10 \$717 57 116 \$891 2 10.8 Misc. Ash Handling Equipment 899 1,101 333 23 \$2,356 188 382 \$2,926 8 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$125 0 | 0.9 | | \$10.807 | | | | | | | | | | |
| 9.1 Cooling Towers 3,280 781 55 \$4,116 329 444 \$4,889 13 9.2 Circulating Water Pumps 517 50 4 \$570 46 62 \$678 2 9.3 Circ. Water System Auxiliaries 64 9 1 \$74 6 8 \$87 0 9.5 Make-up Water System 143 214 15 \$371 30 80 \$481 1 9.6 Component Cooling Water Sys 283 338 250 18 \$888 71 192 \$1,151 3 9.9 Circ. Water System Foundations 916 1,623 114 \$2,652 212 859 \$3,724 10 \$80 \$1.248 \$1.02 \$1.03 \$1.02 \$1.03 \$1.02 \$1.03 \$1.02 \$1.03 \$1.03 \$1.02 \$1.03 \$1.03 \$1.03 \$1.03 \$1.05 | a | | \$19,007 | φ 4 ,103 | \$5,520 | φ + 1+ | | φ30,311 | \$2,425 | | φ 4 ,03 i | φ30,707 | 31 |
| 9.2 Circulating Water Pumps 9.3 Circ. Water System Auxiliaries 9.4 Circ. Water System Auxiliaries 9.5 Make-up Water System Auxiliaries 9.5 Make-up Water System 9.6 Component Cooling Water Sys 9.9 Circ. Water System Foundations 9.9 Circ. Water System Foundations 9.1 Component Cooling Water Sys 9.9 Circ. Water System Foundations 9.1 Component Cooling Water Sys 9.9 Circ. Water System Foundations 9.1 Component Cooling Water Sys 9.9 Circ. Water System Foundations 9.1 Component Cooling Water Sys 9.1 Component Cooling Water Sys 9.1 Component Cooling Water Sys 9.2 Circ. Water System Foundations 9.1 Component Cooling Water Sys 9.2 Circ. Water System Foundations 9.1 Component Cooling Water Sys 9.2 Circ. Water System Foundations 9.1 Component Cooling Water Sys 9.2 Circ. Water System Foundations 9.1 Component Sys 9.2 Circ. Water System Foundations 9.1 Circ. Water System Foundations 9. | - | | 3 280 | | 781 | 55 | | \$4 116 | 320 | | 444 | \$4.880 | 13 |
| 9.3 Circ. Water System Auxiliaries 64 9 1 \$\frac{1}{3}\text{4} \text{1,398} 98 \$\frac{1}{3}\text{2,740} \text{219} \text{592} \text{3,550} 9 \\ 9.5 Make-up Water System 143 214 15 \$\frac{3}{3}\text{371} 30 80 \$\frac{3}{4}\text{81} 1 \\ 9.6 Component Cooling Water Sys 283 338 250 18 \$\frac{3}{8}\text{888} 71 \text{192} \$\frac{1}{3}\text{2,151} 3 \\ 9.9 Circ. Water System Foundations 916 1,623 114 \$\frac{2}{3}\text{52} \\ \text{500} \text{500} \\ \text{500} \tex | | | | | | | | | | | | | |
| 9.4 Circ. Water Píping 9.5 Make-up Water System 9.6 Component Cooling Water Sys 9.9 Circ. Water System 9.9 Circ. Water System Foundations 9.0 Circ. Water System Foundations 9.1 Circ. Water System Foundations 9.1 Circ. Water System Foundations 9.2 SUBTOTAL 9. 9. \$4,286 \$2,498 \$4,325 \$303 \$11,411 \$913 \$2,352 \$14,561 38 \$10.1 Ash Coolers 10.1 Ash Coolers 10.2 Ash Letdown 10.3 HGCU Ash Depressurization 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 10.7 Ash Transport & Feed Equipment 10.8 Misc. Ash Handling Equipment 10.8 Misc. Ash Handling Equipment 10.9 Ash/Spent Sorbent Foundation 10.9 Ash/Spent Foundat | | | | | | - | | | | | | | |
| 9.5 Make-up Water System 9.6 Component Cooling Water Sys 9.9 Circ. Water System Foundations 9.9 Circ. Water System Foundations 9.9 Circ. Water System Foundations SUBTOTAL 9. \$4,286 \$2,498 \$4,325 \$303 \$11,411 \$2,655 212 859 \$3,724 10 ASH/SPENT SORBENT HANDLING SYS 10.1 Ash Coolers 10.2 Ash Letdown 10.3 HGCU Ash Depressurization 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 10.7 Ash Transport & Feed Equipment 10.8 Misc. Ash Handling Equipment 10.8 Misc. Ash Handling Equipment 10.8 Misc. Ash Handling Equipment 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$889 7 29 \$32 \$1,151 3 \$10 \$3,771 \$30 \$80 \$1,151 \$3 \$11,411 \$2,265 \$2,237 \$14,561 \$38 \$ | | | 04 | 1 244 | | | | | | | | | |
| 9.6 Component Cooling Water Sys 9.9 Circ. Water System Foundations 9.9 Circ. Water System Foundations 9.8 Substantial Substant | | | 143 | ., | | | | | | | | | |
| 9.9 Circ.Water System Foundations SUBTOTAL 9. SUBTOTAL | | | | 338 | | | | | | | | | |
| SUBTOTAL 9. \$4,286 \$2,498 \$4,325 \$303 \$11,411 \$913 \$2,237 \$14,561 38 10 | | | | | | | | | | | | | |
| 10. ASH/SPENT SORBENT HANDLING SYS 10.1 Ash Coolers | | | \$4,286 | | | | | * / | | | | | |
| 10.1 Ash Coolers w/10.2&10.3 341 24 \$364 29 39 \$433 1 10.2 Ash Letdown 1,546 8 36 2 \$1,592 127 159 282 \$2,160 6 10.3 HGCU Ash Depressurization 3,060 46 154 11 \$3,271 262 327 579 \$4,439 12 12 12 12 13 13 14 14 14 15 15 15 15 15 | 10 | ASH/SPENT SORBENT HANDLING SYS | | • , | . , | • | | , , | | | . , - | , , | |
| 10.2 Ash Letdown 1,546 8 36 2 \$1,592 127 159 282 \$2,160 6 10.3 HGCU Ash Depressurization 3,060 46 154 11 \$3,271 262 327 579 \$4,439 12 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 434 477 33 \$944 76 153 \$1,173 3 10.7 Ash Transport & Feed Equipment 565 142 10 \$717 57 116 \$891 2 10.9 Ash/Spent Sorbent Foundation 899 1,101 333 23 \$2,356 188 382 \$2,926 8 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$125 0 | | | | | 341 | 24 | | \$364 | 29 | | 39 | \$433 | 1 |
| 10.3 HGCU Ash Depressurization 3,060 46 154 11 \$3,271 262 327 579 \$4,439 12 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 434 477 33 \$944 76 153 \$1,173 3 10.7 Ash Transport & Feed Equipment 565 142 10 \$717 57 116 \$891 2 10.8 Misc. Ash Handling Equipment 899 1,101 333 23 \$2,356 188 382 \$2,926 8 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$125 0 | 10.2 | Ash Letdown | 1,546 | 8 | 36 | 2 | | \$1,592 | 127 | 159 | 282 | \$2,160 | 6 |
| 10.4 High Temperature Ash Piping 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 434 477 33 \$944 76 153 \$1,173 3 10.7 Ash Transport & Feed Equipment 565 142 10 \$717 57 116 \$891 2 10.8 Misc. Ash Handling Equipment 899 1,101 333 23 \$2,356 188 382 \$2,926 8 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$125 0 | | | 3,060 | 46 | 154 | 11 | | \$3,271 | 262 | 327 | 579 | \$4,439 | 12 |
| 10.5 Other Ash Recovery Equipment 10.6 Ash Storage Silos 434 477 33 \$944 76 153 \$1,173 3 10.7 Ash Transport & Feed Equipment 565 142 10 \$717 57 116 \$891 2 10.8 Misc. Ash Handling Equipment 899 1,101 333 23 \$2,356 188 382 \$2,926 8 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$125 0 | | | | | | | | | | | | , , , , , | - |
| 10.6 Ash Storage Silos 434 477 33 \$944 76 153 \$1,173 3 10.7 Ash Transport & Feed Equipment 565 142 10 \$717 57 116 \$891 2 10.8 Misc. Ash Handling Equipment 899 1,101 333 23 \$2,356 188 382 \$2,926 8 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$125 0 | | | | | | | | | | | | | |
| 10.8 Misc. Ash Handling Equipment 899 1,101 333 23 \$2,356 188 382 \$2,926 8 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$125 0 | | | 434 | | 477 | 33 | | \$944 | 76 | | 153 | \$1,173 | 3 |
| 10.8 Misc. Ash Handling Equipment 899 1,101 333 23 \$2,356 188 382 \$2,926 8 10.9 Ash/Spent Sorbent Foundation 37 49 3 \$89 7 29 \$125 0 | 10.7 | Ash Transport & Feed Equipment | 565 | | 142 | 10 | | \$717 | 57 | | 116 | \$891 | 2 |
| | 10.8 | Misc. Ash Handling Equipment | 899 | 1,101 | 333 | 23 | | \$2,356 | 188 | | 382 | \$2,926 | |
| SUBTOTAL 10. \$6,504 \$1,192 \$1,531 \$107 \$9,334 \$747 \$486 \$1,580 \$12,147 32 | 10.9 | Ash/Spent Sorbent Foundation | | 37 | 49 | 3 | | \$89 | 7 | | 29 | \$125 | 0 |
| | | SUBTOTAL 10. | \$6,504 | \$1,192 | \$1,531 | \$107 | | \$9,334 | \$747 | \$486 | \$1,580 | \$12,147 | 32 |

14-Aug-98

10:52 AM

Report Date:

Client: DEPARTMENT OF ENERGY Report Date: 14-Aug-98
Project: Market Based Advanced Coal Power Systems 10.52 AM
10.52 AM

TOTAL PLANT COST SUMMARY

Case: 2gPFBCw/Boost

 Plant Size:
 379.2 MW,net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998
 (\$x1000)

| Acct | | Equipment | Material | Lak | | | Bare Erected | | Conting | | TOTAL PLANT | |
|------|--------------------------------|-----------|----------|----------|----------------|-----|--------------|-----------|----------|----------|-------------|-------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | | | | | | |
| | Generator Equipment | 1,373 | | 273 | 19 | | \$1,665 | 133 | | 180 | \$1,978 | |
| | Station Service Equipment | 2,468 | | 203 | 14 | | \$2,686 | 215 | | 290 | \$3,191 | |
| | Switchgear & Motor Control | 1,968 | | 327 | 23 | | \$2,318 | 185 | | 376 | \$2,879 | |
| | Conduit & Cable Tray | | 1,187 | 3,723 | 261 | | \$5,170 | 414 | | 1,117 | \$6,701 | |
| | Wire & Cable | | 1,274 | 1,272 | 89 | | \$2,635 | 211 | | 569 | \$3,415 | |
| | Protective Equipment | | 98 | 327 | 23 | | \$449 | 36 | | 73 | \$557 | |
| | Standby Equipment | 685 | | 15 | 1 | | \$701 | 56 | | 114 | \$871 | |
| | Main Power Transformers | 3,227 | | 362 | 25 | | \$3,614 | 289 | | 585 | \$4,488 | |
| 11.9 | Electrical Foundations | | 156 | 430 | 30 | | \$616 | 49 | | 200 | \$865 | |
| | SUBTOTAL 11. | \$9,721 | \$2,715 | \$6,934 | \$485 | | \$19,855 | \$1,588 | | \$3,503 | \$24,946 | 66 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| | PFBC Control Equipment | 183 | | 160 | 11 | | \$354 | 28 | | 57 | \$440 | 1 |
| 12.2 | Combustion Turbine Control | | | | | | | | | | | |
| 12.3 | Steam Turbine Control | | | | | | | | | | | |
| 12.4 | Other Major Component Control | 482 | | 295 | 21 | | \$797 | 64 | | 129 | \$990 | 3 |
| 12.5 | Signal Processing Equipment | w/12.7 | | w/12.7 | | | | | | | | |
| 12.6 | Control Boards, Panels & Racks | 116 | | 68 | 5 | | \$188 | 15 | | 41 | \$244 | . 1 |
| 12.7 | Computer & Accessories | 3,689 | | 135 | 9 | | \$3,834 | 307 | | 414 | \$4,555 | 12 |
| 12.8 | Instrument Wiring & Tubing | | 1,439 | 4,472 | 313 | | \$6,224 | 498 | | 1,344 | \$8,067 | 21 |
| 12.9 | Other I & C Equipment | 849 | | 377 | 26 | | \$1,252 | 100 | | 135 | \$1,488 | 4 |
| | SUBTOTAL 12. | \$5,319 | \$1,439 | \$5,507 | \$385 | | \$12,650 | \$1,012 | | \$2,121 | \$15,783 | 42 |
| 13 | IMPROVEMENTS TO SITE | | | | | | . , | . , | | | | |
| 13.1 | Site Preparation | | 37 | 1,087 | 76 | | \$1,201 | 96 | | 389 | \$1,686 | 4 |
| | Site Improvements | | 564 | 1,107 | 77 | | \$1,748 | 140 | | 566 | \$2,454 | 6 |
| 13.3 | Site Facilities | | 2,748 | 3,236 | 227 | | \$6,210 | 497 | | 2,012 | \$8,719 | 23 |
| | SUBTOTAL 13. | | \$3,349 | \$5,430 | \$380 | | \$9,159 | \$733 | | \$2,967 | \$12,859 | 34 |
| 14 | BUILDINGS & STRUCTURES | | • | | | | | | | | | |
| 14.1 | Combustion Turbine Area | | 293 | 185 | 13 | | \$491 | 39 | | 132 | \$662 | 2 |
| 14.2 | Steam Turbine Building | | 2,075 | 3,275 | 229 | | \$5,580 | 446 | | 1,507 | \$7,533 | |
| | Administration Building | | 421 | 340 | 24 | | \$785 | 63 | | 212 | \$1,060 | |
| 14.4 | Circulation Water Pumphouse | | 83 | 49 | 3 | | \$135 | 11 | | 37 | \$183 | |
| | Water Treatment Buildings | | 525 | 570 | 40 | | \$1,135 | 91 | | 307 | \$1,533 | |
| | Machine Shop | | 216 | 164 | 11 | | \$391 | 31 | | 106 | \$528 | |
| | Warehouse | | 348 | 250 | 18 | | \$616 | 49 | | 166 | \$831 | |
| | Other Buildings & Structures | | 208 | 181 | 13 | | \$402 | 32 | | 108 | \$542 | |
| | Waste Treating Building & Str. | | 466 | 991 | 69 | | \$1.526 | 122 | | 412 | \$2,061 | |
| | SUBTOTAL 14. | | \$4,635 | \$6,006 | \$420 | | \$11,061 | \$885 | | \$2,986 | \$14,932 | |
| | 332.01AL 14. | | Ψ-1,000 | ψ0,000 | ψ-7 2 0 | | ψ,σοι | 4000 | | Ψ2,500 | ψ1-7,552 | 55 |
| | TOTAL COST | \$177,562 | \$38,572 | \$66,624 | \$4,653 | | \$287,411 | \$22,993 | \$18,752 | \$50,379 | \$379,535 | 1001 |

| CONTINGENCY FACTORS 2gPFBCw/Boost | | | | | | | | |
|--|--------------------------------|-------------------------------|--|--|--|--|--|--|
| Item/Description | Contingency <u>%Process</u> | Factors(%) <u>%Project</u> | | | | | | |
| COAL & SORBENT HANDLING | | 21.1 | | | | | | |
| COAL & SORBENT PREP & FEED | 3.6 | 13.7 | | | | | | |
| FEEDWATER & MISC. BOP SYSTEMS | | 23.8 | | | | | | |
| CARBONIZER, PFBC & PFB HTX | | | | | | | | |
| PFB PRESSURE VESSEL | 15.0 | 10.0 | | | | | | |
| PFBC Boiler | 15.0 | 10.0 | | | | | | |
| PFBC Economizer | 15.0 | 10.0 | | | | | | |
| Other PFBC Equipment | 0.6 | 20.2 | | | | | | |
| HOT GAS CLEANUP & PIPING | 17.2 | 20.1 | | | | | | |
| COMBUSTION TURBINE/ACCESSORIES | | | | | | | | |
| Combustion Turbine Generator | 15.0 | 10.0 | | | | | | |
| C.T. Booster Air System & BOA | | 21.7 | | | | | | |
| HRSG, DUCTING & STACK | | | | | | | | |
| Heat Recovery Steam Generator | | 10.0 | | | | | | |
| HRSG Accessories, Ductwork and Stack | | 14.2 | | | | | | |
| STEAM TURBINE GENERATOR | | | | | | | | |
| Steam TG & Accessories | | 10.0 | | | | | | |
| Turbine Plant Auxiliaries and Steam Piping | | 16.8 | | | | | | |
| COOLING WATER SYSTEM | | 18.2 | | | | | | |
| ASH/SPENT SORBENT HANDLING SYS | 5.2 | 15.0 | | | | | | |
| ACCESSORY ELECTRIC PLANT | | 16.3 | | | | | | |
| INSTRUMENTATION & CONTROL | | 15.5 | | | | | | |
| IMPROVEMENTS TO SITE | | 30.0 | | | | | | |
| BUILDINGS & STRUCTURES | | 25.0 | | | | | | |
| | | | | | | | | |

| OPERATING LABOR REQUIREMENTS | | | | | | | | |
|--|----------------|--------------|--|--|--|--|--|--|
| 2gPFBCw/Boost | | | | | | | | |
| Operating Labor Rate(base): | 25.89 \$/hour | | | | | | | |
| Operating Labor Burden: | 30.00 % of bas | е | | | | | | |
| Labor O-H Charge Rate: 25.00 % of labor | | | | | | | | |
| Operating Labor Requirements(O.J.)per Shift: | | Total | | | | | | |
| Category | 1 unit/mod. | <u>Plant</u> | | | | | | |
| Skilled Operator | 2.0 | 2.0 | | | | | | |
| Operator | 7.0 | 7.0 | | | | | | |
| Foreman | 1.0 | 1.0 | | | | | | |
| Lab Tech's, etc. | <u>2.0</u> | <u>2.0</u> | | | | | | |
| TOTAL-O.J.'s | 12.0 | 12.0 | | | | | | |

| CONSUMABLES, BY-PROD | UCTS & FUELS DATA | | | |
|---|-------------------|-------|--------|--|
| 2gPFBCw/Boost | | | Unit | |
| | Consumption | | | |
| Item/Description | <u>Initial</u> | /Day | _Cost_ | |
| Water(/1000 gallons) | | 2,955 | 0.80 | |
| Chemicals | | | | |
| MU & WT Chem.(lbs) | 264,049 | 8,802 | 0.16 | |
| Limestone (ton) | 14,503 | 483.4 | 16.25 | |
| Z Sorb (ton)** | , | | 3.50 | |
| Nahcolite(ton) | | | 270.00 | |
| Other Supplemental Fuel(MBtu) Gases,N2 etc.(/100scf) L.P. Steam(/1000 pounds) | | | 1.50 | |
| Waste Disposal | | | | |
| Sludge(ton) | | | | |
| Slag(ton) | | 754 | 10.00 | |
| By-products & Emissions Sulfuric Acid(pounds) | | | 68.00 | |
| Fuel(ton) | | 2,835 | 29.29 | |

| MAINTENANCE FACTORS 2gPFBCw/Boost | |
|--|------------------|
| Item/Description | Maintenance % |
| COAL & SORBENT HANDLING | 2.5 |
| COAL & SORBENT PREP & FEED | 3.1 |
| FEEDWATER & MISC. BOP SYSTEMS | 2.0 |
| CARBONIZER, PFBC & PFB HTX | |
| PFB PRESSURE VESSEL | 5.0 |
| PFBC Boiler | 4.5 |
| PFBC Economizer | 4.0 |
| Other PFBC Equipment | 1.6 |
| HOT GAS CLEANUP & PIPING | 6.7 |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | 12.9 |
| C.T. Booster Air System & BOA | 2.0 |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | 2.0 |
| HRSG Accessories, Ductwork and Stack | 1.4 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 1.5 |
| Turbine Plant Auxiliaries and Steam Piping | 1.7 |
| COOLING WATER SYSTEM | 1.3 |
| ASH/SPENT SORBENT HANDLING SYS | 3.3 |
| ACCESSORY ELECTRIC PLANT | 1.5 |
| INSTRUMENTATION & CONTROL | 1.6 |
| IMPROVEMENTS TO SITE | 1.3 |
| BUILDINGS & STRUCTURES | 1.4 |
| | |

Natural Gas Combined Cycle "G" Class Gas Turbine

| CAPITAL INVESTMENT & | REVENUE REQUIRE | EMENT SUMMAR | RY | |
|--|---------------------|-----------------|--------------|--------------|
| TITLE/DEFINITION | | | | |
| Case: | Natural Gas Combine | | | |
| Plant Size: | 326.1 (MW,n | , | | (Btu/kWh) |
| 1 | Natural Gas | Cost: | | (\$/MMBtu) |
| Design/Construction: | 2.25 (years) | | | (years) |
| TPC(Plant Cost) Year: | 1998 (Jan.) | TPI Year: | 2005 | (Jan.) |
| Capacity Factor: | 65 (%) | | | |
| CAPITAL INVESTMENT | | <u>\$x1000</u> | | <u>\$/kW</u> |
| Process Capital & Facilities | | 137,531 | | 421.7 |
| Engineering(incl.C.M.,H.O.& Fee) | | 11,002 | | 33.7 |
| Process Contingency | | 00.404 | | 60.0 |
| Project Contingency | | 22,434 | | 68.8 |
| TOTAL PLANT COST(TPC) | | \$170,968 | | 524.2 |
| TOTAL CASH EXPENDED | \$170 | | | 022 |
| AFDC | | ,403 | | |
| TOTAL PLANT INVESTMENT(TPI) | • | \$177,371 | | 543.8 |
| Payalty Allowana | | | | |
| Royalty Allowance Preproduction Costs | | 5.157 | | 15.8 |
| Inventory Capital | | 471 | | 1.4 |
| Initial Catalyst & Chemicals(w/equip.) | | | | |
| Land Cost | | 150 | | 0.5 |
| TOTAL CAPITAL REQUIREMENT(TCR |) | \$183,149 | | 561.6 |
| OPERATING & MAINTENANCE COSTS (1998 D | nollare) | \$x1000 | | \$/kW-yr |
| Operating Labor | oliais) | 1,474 | | 4.5 |
| Maintenance Labor | | 1,228 | | 3.8 |
| Maintenance Material | | 1,842 | | 5.6 |
| Administrative & Support Labor | | 675 | | 2.1 |
| TOTAL OPERATION & MAINTENANCE | | \$5,219 | | 16.0 |
| FIXED O & M | | | 10.40 | \$/kW-yr |
| VARIABLE O & M | | | 0.10 | ¢/kWh |
| CONSUMABLE OPERATING COSTS,less Fuel | (1998 Dollars) | \$x1000 | | ¢/kWh |
| Water | , | 429 | | 0.02 |
| Chemicals | | 249 | | 0.01 |
| Other Consumables Waste Disposal | | | | |
| Waste Disposal | | | | |
| TOTAL CONSUMABLE OPERATING C | OSTS | \$679 | | 0.04 |
| BY-PRODUCT CREDITS (1998 Dollars) | | 400.007 | | 4.00 |
| FUEL COST (1998 Dollars) | | \$33,837 | | 1.82 |
| | 1st Year (2005 \$ | | ized (10th.Y | ear \$) |
| PRODUCTION COST SUMMARY | | kWh | ¢/kWh | |
| Fixed O & M | , | 0.18 10.4/kW-yr | | |
| Variable O & M | | 0.10 | 0.10 | |
| Consumables By product Credit | | 0.04 | 0.04 | |
| By-product Credit Fuel | | 1 92 | 1.04 | |
| TOTAL PRODUCTION COST | | 1.83 2.14 | 1.94 2.26 | |
| LEVELIZED CARRYING CHARGES(Capital) | | 75.8/kW-yr | 1.33 | |
| LEVELIZED (40), V. DUOD TO COOK STORY | | | c =- | |
| LEVELIZED (10th. Year) BUSBAR COST OF PO | <u>vv E K</u> | | 3.59 | |

| ESTIMATE BASIS/FINANCIAL CRIT | ERIA for REVENUE REQUIREMENT (| CALCULATIONS |
|---|--|------------------------|
| GENERAL DATA/CHARACTERISTICS | | |
| Case Title: | Natural Gas Combine | d Cycle-"G" |
| Unit Size:/Plant Size: | 326.1 MW,net | 326.1 MWe |
| Location: | Middletown, USA | |
| Fuel: Primary/Secondary | Natural Gas | |
| Energy From Primary/Secondary Fuels | 6,743 Btu/kWh | Btu/kWh |
| Levelized Capacity Factor / Preproduction(equi | valent months): 65 % | 1 months |
| Capital Cost Year Dollars (Reference Year Doll | ars): 1998 (January) | l |
| Delivered Cost of Primary/Secondary Fuel | 2.70 \$/MBtu | \$/MBtu |
| Design/Construction Period: | 2.25 years | |
| Plant Startup Date (1st. Year Dollars): | 2005 (January) | l |
| Land Area/Unit Cost | 100 acre | \$1,500 /acre |
| FINANCIAL CRITERIA | | |
| Project Book Life: | 20 years | |
| Book Salvage Value: | % | |
| Project Tax Life: | 20 years | |
| Tax Depreciation Method: | Accel. based on ACR | S Class |
| Property Tax Rate: | 1.0 % per yea | ar |
| Insurance Tax Rate: | 1.0 % per yea | ar |
| Federal Income Tax Rate: | 34.0 % | |
| State Income Tax Rate: | 6.0 % | |
| Investment Tax Credit/% Eligible | % | % |
| Economic Basis: | 10th.Year Constant | Dollars |
| Capital Structure Common Equity Preferred Stock | <u>% of Total</u> 20 | <u>Cost(%)</u> 16.5 |
| Debt Weighted Cost of Capital:(after tax) | 80 6 | 5.8 6.2 % |
| Escalation Rates | Over Book LifeGeneral% per yeaPrimary Fuel1.2 % per yeaSecondary Fuel1.2 % per yea | ar 0.041 % per year |

Client: DEPARTMENT OF ENERGY - Task 36 Project:

Market Based Advanced Coal Power Systems

Report Date:

16-Dec-98

TOTAL PLANT COST SUMMARY

Natural Gas Combined Cycle-"G" 326.1 MW,net Case:

Plant Size:

Estimate Type: Conceptual

(\$x1000) Cost Base (Jan) 1998

| | Flant Size. | 320.1 | ivivv ,riet | LStill | iate Type: C | JULICEL | otuai | CO | st Base (Jan) 1990 | (\$X1000) | |
|------------|---|---|-------------------|--------------------------------|-------------------|---------|--|------------------------------|-------------------------|--|-----------------------|
| Acct | | Equipment | Material | Lab | | | Bare Erected | | Contingencies | TOTAL PLANT | |
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | | | | | | | | | | |
| 2 | COAL & SORBENT PREP & FEED | | | | | | | | | | |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | 4,835 | 2,213 | 3,785 | 265 | | \$11,097 | 888 | 2,905 | \$14,891 | 46 |
| 4.2 4.3 | GASIFIER & ACCESSORIES Gasifier & Auxiliaries High Temperature Cooling Recycle Gas System Other Gasification Equipment SUBTOTAL 4 | | | | | | | | | | |
| 5 | HOT GAS CLEANUP & PIPING | | | | | | | | | | |
| 1 | COMBUSTION TURBINE/ACCESSORIE Combustion Turbine Generator Combustion Turbine Accessories SUBTOTAL 6 | 39,817 39,817 | 136 <i>136</i> | 2,820 157 2,977 | 197 11 208 | | \$42,834 \$305 \$43,139 | 3,427 24 <i>3,451</i> | 4,626 99 4,725 | \$50,887 \$428 \$51,315 | 156 1 157 |
| | HRSG, DUCTING & STACK Heat Recovery Steam Generator HRSG Accessories, Ductwork and Stack SUBTOTAL 7 | 12,541 1,750 <i>14</i> ,29 <i>1</i> | 651 651 | 1,803 1,236 <i>3,039</i> | 126 87 213 | | \$14,470 \$3,724 <i>\$18,194</i> | 1,158 298 <i>1,456</i> | 1,563 558 2,121 | \$17,190 \$4,580 <i>\$21,770</i> | 53 14 <i>67</i> |
| | STEAM TURBINE GENERATOR Steam TG & Accessories Turbine Plant Auxiliaries and Steam Piping SUBTOTAL 8 | 9,644 4,365 <i>14,010</i> | 133 <i>133</i> | 1,589 2,394 3,983 | 111 168 279 | | \$11,345 \$7,060 \$18,404 | 908 565 1,472 | 1,225 1,313 2,538 | \$13,477 \$8,937 \$22,415 | 41 27 69 |
| 9 | COOLING WATER SYSTEM | 3,113 | 1,728 | 2,934 | 205 | | \$7,980 | 638 | 1,549 | \$10,168 | 31 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | | | | | | | | | | |
| 11 | ACCESSORY ELECTRIC PLANT | 7,525 | 1,799 | 4,793 | 336 | | \$14,454 | 1,156 | 2,530 | \$18,140 | 56 |
| 12 | INSTRUMENTATION & CONTROL | 2,668 | 1,367 | 4,760 | 333 | | \$9,128 | 730 | 1,644 | \$11,501 | 35 |
| 13 | IMPROVEMENTS TO SITE | 1,674 | 962 | 3,352 | 235 | | \$6,224 | 498 | 2,016 | \$8,738 | 27 |
| 14 | BUILDINGS & STRUCTURES | | 3,731 | 4,841 | 339 | | \$8,911 | 713 | 2,406 | \$12,030 | 37 |
| | TOTAL COST | \$87,934 | \$12,721 | \$34,464 | \$2,412 | | \$137,531 | \$11,002 | \$22,434 | \$170,968 | 524 |

Client: DEPARTMENT OF ENERGY - Task 36 Report Date: 16-Dec-98 05:28 PM

Project: Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Natural Gas Combined Cycle-"G" 326.1 MW,net Case:

Plant Size: Estimate Type: Conceptual Cost Base (Jan) 1998 (\$x1000)

| Acct | | Equipment | Material | Lal | .or | Salac | Bare Erected | Engia CM | Contino | ronoios | TOTAL PLANT | COST |
|------|-------------------------------------|----------------|----------------|-----------|--------------|-------|--------------|---|---------|-----------------|----------------|-----------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 1 | COAL & SORBENT HANDLING | COSI | CUSI | Direct | munect | Тах | COSL | n.o.a ree | FIOCESS | Froject | Ψ | ⊅/ IV V V |
| 1 . | Coal Receive & Unload | | | | | | | | | | | |
| | Coal Stackout & Reclaim | | | | | | | | | | | |
| | Coal Conveyors & Yd Crush | | | | | | | | | | | |
| | Other Coal Handling | | | | | | | | | | | |
| | Sorbent Receive & Unload | | | | | | | | | | | |
| 1 | Sorbent Stackout, Storage & Reclaim | | | | | | | | | | | |
| | Sorbent Conveyors | | | | | | | | | | | |
| | Other Sorbent Handling | | | | | | | | | | | |
| | Coal & Sorbent Hnd.Foundations | | | | | | | | | | | |
| 1.5 | SUBTOTAL 1. | | | | | | | | | | | |
| 2 | COAL & SORBENT PREP & FEED | | | | | | | | | | | |
| | Coal Crushing & Drying | | | | | | | | | | | |
| | Prepared Coal Storage & Feed | | | | | | | | | | | |
| | Coal & Sorbent Feed System | | | | | | | | | | | |
| | Misc.Coal Prep & Feed | | | | | | | | | | | |
| | Sorbent Prep Equipment | | | | | | | | | | | |
| | Sorbent Storage & Feed | | | | | | | | | | | |
| | Sorbent Injection System | | | | | | | | | | | |
| | Booster Air Supply System | | | | | | | | | | | |
| | Coal & Sorbent Feed Foundation | | | | | | | | | | | |
| 2.0 | SUBTOTAL 2. | | | | | | | | | | | |
| 3 | FEEDWATER & MISC. BOP SYSTEMS | | | | | | | | | | | |
| | FeedwaterSystem | 593 | 1.153 | 615 | 43 | | \$2,404 | 192 | | 519 | \$3,116 | 10 |
| | Water Makeup & Pretreating | 346 | 37 | 198 | 14 | | \$595 | 48 | | 193 | \$835 | 3 |
| | Other Feedwater Subsystems | 353 | 132 | 120 | 8 | | \$613 | 49 | | 132 | \$794 | 2 |
| | Service Water Systems | 27 | 57 | 200 | 14 | | \$298 | 24 | | 97 | \$418 | 1 |
| | Other Boiler Plant Systems | 1,130 | 456 | 1.143 | 80 | | \$2,809 | 225 | | 607 | \$3,641 | 11 |
| | FO Supply Sys & Nat Gas | 84 | 159 | 300 | 21 | | \$565 | 45 | | 122 | \$732 | 2 |
| | Waste Treatment Equipment | 687 | .00 | 402 | 28 | | \$1.118 | 89 | | 362 | \$1,569 | 5 |
| | Misc. Power Plant Equipment | 1,616 | 219 | 805 | 56 | | \$2,696 | 216 | | 873 | \$3,785 | 12 |
| 0.0 | SUBTOTAL 3. | | \$2,213 | \$3,785 | \$265 | | \$11,097 | \$888 | | \$2,905 | \$14,891 | 46 |
| 4 | GASIFIER & ACCESSORIES | V 1,000 | V =,=.0 | 40,100 | 4 _00 | | 4,551 | , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | \$ 2,000 | V 1,001 | |
| 4.1 | Gasifier & Auxiliaries | | | | | | | | | | | |
| | High Temperature Cooling | | | | | | | | | | | |
| | Recycle Gas System | | | | | | | | | | | |
| | Booster Air Compression | | | | | | | | | | | |
| | Misc. Gasification Equipment | w/4.1&4.2 | , | w/4.1&4.2 | | | | | | | | |
| | Other Gasification Equipment | | | | | | | | | | | |
| | Major Component Rigging | w/4.1&4.2 | , | w/4.1&4.2 | | | | | | | | |
| | Gasification Foundations | | | | | | | | | | | |
| | SUBTOTAL 4. | | | | | | | | | | | |
| | | | | | | | | | | | • | |

Client: DEPARTMENT OF ENERGY - Task 36 Project:

Market Based Advanced Coal Power Systems

TOTAL PLANT COST SUMMARY

Natural Gas Combined Cycle-"G" 326.1 MW,net Case:

Plant Size: Estimate Type: Conceptual (\$x1000) Cost Base (Jan) 1998

Report Date:

16-Dec-98

05:28 PM

| Acct | | Equipment | Material | Lat | | | Bare Erected | | Conting | | TOTAL PLANT | |
|------|---|-----------|----------|---------|---------------|-----|-----------------|-----------|---------|-----------------|-----------------|-------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| _ | | | | | | | | | | | | |
| 5 | HOT GAS CLEANUP & PIPING | | | | | | | | | | | |
| | Gas Desulfurization(Trans.Reactor) | | | | | | | | | | | |
| | 2 Sulfur Recovery (Sulfator Sys.) | | | | | | | | | | | |
| | 3 Chloride Guard | | | | | | | | | | | |
| 1 | Particulate Removal | | | | | | | | | | | |
| | 5 Blowback Gas Systems | | | | | | | | | | | |
| | 6 Fuel Gas Piping 9 HGCU Foundations | | | | | | | | | | | |
| 5.8 | SUBTOTAL 5. | | | | | | | | | | | |
| 6 | COMBUSTION TURBINE/ACCESSORIE | | | | | | | | | | | |
| | Combustion Turbine Generator | 39,817 | | 2,820 | 197 | | \$42,834 | 2 427 | | 4,626 | ¢50 007 | 156 |
| | 2 Combustion Turbine Generator | w/6.1 | | w/6.1 | 197 | | \$42,034 | 3,427 | | 4,020 | \$50,887 | 136 |
| | 3 Compressed Air Piping | W/6.1 | | W/O. I | | | | | | | | |
| | O Compressed All Fibring O Combustion Turbine Foundations | | 136 | 157 | 11 | | \$305 | 24 | | 99 | \$428 | 1 |
| 0.8 | SUBTOTAL 6. | \$39,817 | \$136 | \$2,977 | \$208 | | \$43,139 | \$3,451 | | \$4,72 5 | \$51,315 | 157 |
| 7 | HRSG, DUCTING & STACK | \$39,017 | \$130 | ΨZ,911 | \$200 | | Ψ43,139 | \$3,43 I | | Φ4,72 3 | \$51,515 | 137 |
| 1 | Heat Recovery Steam Generator | 12,541 | | 1,803 | 126 | | \$14,470 | 1,158 | | 1,563 | \$17,190 | 53 |
| | 2 HRSG Accessories | 12,541 | | 1,003 | 120 | | \$14,470 | 1,136 | | 1,505 | \$17,190 | 33 |
| 1 | B Ductwork | | 565 | 485 | 34 | | \$1,085 | 87 | | 234 | \$1,406 | 4 |
| | Stack | 1,750 | 303 | 665 | 47 | | \$2,461 | 197 | | 266 | \$2,924 | 9 |
| 1 | HRSG, Duct & Stack Foundations | 1,730 | 86 | 86 | 6 | | \$178 | 14 | | 58 | \$250 | 1 |
| / | SUBTOTAL 7. | \$14,291 | \$651 | \$3,039 | \$213 | | \$18,194 | \$1,456 | | \$2,121 | \$21,770 | 67 |
| 8 | STEAM TURBINE GENERATOR | \$14,231 | φ03 i | φ5,059 | Ψ Z 13 | | \$10,134 | \$1,430 | | ΨΖ, ΙΖ Ι | Ψ21,770 | 0, |
| | Steam TG & Accessories | 9,644 | | 1.589 | 111 | | \$11,345 | 908 | | 1,225 | \$13,477 | 41 |
| 1 | 2 Turbine Plant Auxiliaries | 69 | | 160 | 11 | | \$240 | 19 | | 26 | \$285 | 71 |
| 1 | 3 Condenser & Auxiliaries | 1,776 | | 491 | 34 | | \$2,301 | 184 | | 249 | \$2,734 | 8 |
| | Steam Piping | 2,521 | | 1,328 | 93 | | \$3.942 | 315 | | 851 | \$5,108 | 16 |
| | TG Foundations | 2,521 | 133 | 415 | 29 | | \$577 | 46 | | 187 | \$810 | 2 |
| 0.0 | SUBTOTAL 8. | \$14,010 | \$133 | \$3,983 | \$279 | | \$18,404 | \$1,472 | | \$2,538 | \$22,415 | 69 |
| 9 | COOLING WATER SYSTEM | ψ14,010 | ψ100 | ψ0,000 | Ψ2.0 | | \$10,707 | Ψ1,-1.2 | | Ψ2,000 | V22, 410 | - 00 |
| 1 - | Cooling Towers | 2.381 | | 528 | 37 | | \$2.947 | 236 | | 318 | \$3,501 | 11 |
| | 2 Circulating Water Pumps | 348 | | 33 | 2 | | \$384 | 31 | | 41 | \$456 | 1 |
| | 3 Circ.Water System Auxiliaries | 42 | | 6 | 0 | | \$49 | 4 | | 5 | \$58 | o l |
| | Circ.Water Piping | , | 826 | 928 | 65 | | \$1,819 | 146 | | 393 | \$2,357 | 7 |
| | 5 Make-up Water System | 95 | | 142 | 10 | | \$247 | 20 | | 53 | \$320 | 1 |
| | Component Cooling Water Sys | 246 | 294 | 219 | 15 | | \$774 | 62 | | 167 | \$1,003 | 3 |
| | Circ.Water System Foundations | | 608 | 1,078 | 75 | | \$1,761 | 141 | | 571 | \$2,472 | 8 |
| | SUBTOTAL 9. | \$3,113 | \$1,728 | \$2,934 | \$205 | | \$7,980 | \$638 | | \$1,549 | \$10,168 | 31 |
| 10 | ASH/SPENT SORBENT HANDLING SYS | | • , | * , | • | | , , , | • • • • • | | * , | , , , , , | - 1 |
| | Gasifier Ash Removal | | | | | | | | | | | |
| | 2 Gasifier Ash Depressurization | | | | | | | | | | | |
| | 3 Cleanup Ash Depressurization | | | | | | | | | | | |
| | High Temperature Ash Piping | | | | | | | | | | | |
| | Other Ash Recovery Equipment | | | | | | | | | | | |
| | S Ash Storage Silos | | | | | | | | | | | |
| | Ash Transport & Feed Equipment | | | | | | | | | | | |
| | Misc. Ash Handling Equipment | | | | | | | | | | | |
| | Ash/Spent Sorbent Foundation | | | | | | | | | | | |
| | SUBTOTAL 10. | | | | | | | | | | | |
| | | | | | | | | | | | | |

 Client:
 DEPARTMENT OF ENERGY - Task 36
 Report Date:
 16-Dec-98

 Project:
 Market Based Advanced Coal Power Systems
 05-28 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"G"

 Plant Size:
 326.1 MW,net
 Estimate Type: Conceptual
 Cost Base (Jan)
 1998
 (\$x1000)

| Acct | | Equipment | Material | Lab | or | Sales | Bare Erected | Eng'a CM | Conting | encies | TOTAL PLANT | COST |
|------|--------------------------------|-----------|----------|----------|----------|-------|--------------|-----------|---------|----------|-------------|-------|
| No. | Item/Description | Cost | Cost | Direct | Indirect | Tax | Cost \$ | H.O.& Fee | Process | Project | \$ | \$/kW |
| 11 | ACCESSORY ELECTRIC PLANT | | | | | | • | | | | , | |
| 11.1 | Generator Equipment | 1,233 | | 196 | 14 | | \$1,442 | 115 | | 156 | \$1,713 | 5 |
| 11.2 | Station Service Equipment | 1,598 | | 132 | 9 | | \$1,739 | 139 | | 188 | \$2,067 | 6 |
| 11.3 | Switchgear & Motor Control | 1,274 | | 212 | 15 | | \$1,501 | 120 | | 243 | \$1,864 | 6 |
| 11.4 | Conduit & Cable Tray | , | 768 | 2,411 | 169 | | \$3,348 | 268 | | 723 | \$4,339 | |
| 11.5 | Wire & Cable | | 825 | 824 | 58 | | \$1,706 | 137 | | 369 | \$2,211 | 7 |
| 11.6 | Protective Equipment | | 69 | 230 | 16 | | \$316 | 25 | | 51 | \$392 | 1 |
| 11.7 | Standby Equipment | 585 | | 13 | 1 | | \$599 | 48 | | 97 | \$743 | 2 |
| 11.8 | Main Power Transformers | 2,835 | | 397 | 28 | | \$3,260 | 261 | | 528 | \$4,049 | 12 |
| 11.9 | Electrical Foundations | | 137 | 378 | 26 | | \$542 | 43 | | 175 | \$760 | 2 |
| | SUBTOTAL 11. | \$7,525 | \$1,799 | \$4,793 | \$336 | | \$14,454 | \$1,156 | | \$2,530 | \$18,140 | 56 |
| 12 | INSTRUMENTATION & CONTROL | | | | | | | | | | | |
| 12.1 | IGCC Control Equipment | | | | | | | | | | | |
| 12.2 | Combustion Turbine Control | | | | | | | | | | | |
| 12.3 | Steam Turbine Control | | | | | | | | | | | |
| 12.4 | Other Major Component Control | | | | | | | | | | | |
| | Signal Processing Equipment | w/12.7 | | w/12.7 | | | | | | | | |
| | Control Boards, Panels & Racks | 110 | | 64 | 5 | | \$179 | 14 | | 39 | \$232 | |
| 12.7 | Computer & Accessories | 1,752 | | 90 | 6 | | \$1,848 | 148 | | 200 | \$2,195 | |
| 12.8 | Instrument Wiring & Tubing | | 1,367 | 4,247 | 297 | | \$5,912 | 473 | | 1,277 | \$7,661 | 23 |
| 12.9 | Other I & C Equipment | 806 | | 358 | 25 | | \$1,189 | 95 | | 128 | \$1,413 | |
| | SUBTOTAL 12. | \$2,668 | \$1,367 | \$4,760 | \$333 | | \$9,128 | \$730 | | \$1,644 | \$11,501 | 35 |
| 13 | IMPROVEMENTS TO SITE | | | | | | | | | | | |
| 13.1 | Site Preparation | | 28 | 559 | 39 | | \$626 | 50 | | 203 | \$880 | |
| | Site Improvements | | 934 | 1,153 | 81 | | \$2,168 | 173 | | 702 | \$3,043 | |
| 13.3 | Site Facilities | 1,674 | | 1,640 | 115 | | \$3,429 | 274 | | 1,111 | \$4,815 | |
| | SUBTOTAL 13. | \$1,674 | \$962 | \$3,352 | \$235 | | \$6,224 | \$498 | | \$2,016 | \$8,738 | 27 |
| 14 | BUILDINGS & STRUCTURES | | | | | | | | | | | |
| | Combustion Turbine Area | | 214 | 135 | 9 | | \$359 | 29 | | 97 | \$485 | |
| | Steam Turbine Building | | 1,520 | 2,411 | 169 | | \$4,099 | 328 | | 1,107 | \$5,534 | |
| | Administration Building | | 396 | 320 | 22 | | \$738 | 59 | | 199 | \$997 | 3 |
| | Circulation Water Pumphouse | | 78 | 46 | 3 | | \$127 | 10 | | 34 | \$172 | |
| | Water Treatment Buildings | | 494 | 537 | 38 | | \$1,068 | 85 | | 288 | \$1,442 | |
| | Machine Shop | | 203 | 154 | 11 | | \$368 | 29 | | 99 | \$497 | 2 |
| | Warehouse | | 327 | 235 | 16 | | \$579 | 46 | | 156 | \$782 | |
| | Other Buildings & Structures | | 196 | 170 | 12 | | \$378 | 30 | | 102 | \$510 | |
| 14.9 | Waste Treating Building & Str. | | 303 | 833 | 58 | | \$1,194 | 96 | | 322 | \$1,612 | |
| | SUBTOTAL 14. | | \$3,731 | \$4,841 | \$339 | | \$8,911 | \$713 | | \$2,406 | \$12,030 | 37 |
| | TOTAL COST | \$87,934 | \$12,721 | \$34.464 | \$2,412 | | \$137,531 | \$11.002 | | \$22,434 | \$170.968 | 524 |

| CONTINGENCY FACT Natural Gas Combined Cycle-"G" | ORS | |
|---|----------------------------|-----------------------------|
| Item/Description | Contingency Fa %Process | ctors(%) <u>%Project</u> |
| TION IN DESCRIPTION | <u>/01 100033</u> | <u> 701 10JCCt</u> |
| COAL & SORBENT HANDLING | | |
| COAL & SORBENT PREP & FEED | | |
| FEEDWATER & MISC. BOP SYSTEMS | | 24.2 |
| GASIFIER & ACCESSORIES | | |
| Gasifier & Auxiliaries | | |
| High Temperature Cooling | | |
| Recycle Gas System | | |
| Other Gasification Equipment | | |
| HOT GAS CLEANUP & PIPING | | |
| COMBUSTION TURBINE/ACCESSORIES | | |
| Combustion Turbine Generator | | 10.0 |
| Combustion Turbine Accessories | | 30.0 |
| HRSG, DUCTING & STACK | | |
| Heat Recovery Steam Generator | | 10.0 |
| HRSG Accessories, Ductwork and Stack | | 13.9 |
| STEAM TURBINE GENERATOR | | |
| Steam TG & Accessories | | 10.0 |
| Turbine Plant Auxiliaries and Steam Piping | | 17.2 |
| COOLING WATER SYSTEM | | 18.0 |
| ASH/SPENT SORBENT HANDLING SYS | | |
| ACCESSORY ELECTRIC PLANT | | 16.2 |
| INSTRUMENTATION & CONTROL | | 16.7 |
| IMPROVEMENTS TO SITE | | 30.0 |
| BUILDINGS & STRUCTURES | | 25.0 |
| | | |
| | | |

| OPERATING LABOR R | EQUIREMENTS | | | |
|--|-----------------|--------------|--|--|
| Natural Gas Combined Cycle-"G" | | | | |
| Operating Labor Rate(base): | 25.89 \$/hour | | | |
| Operating Labor Burden: | 30.00 % of base | е | | |
| Labor O-H Charge Rate: 25.00 % of labor | | | | |
| Operating Labor Requirements(O.J.)per Shift: | | Total | | |
| Category | 1 unit/mod. | <u>Plant</u> | | |
| Skilled Operator | 1.0 | 1.0 | | |
| Operator | 2.0 | 2.0 | | |
| Foreman | 1.0 | 1.0 | | |
| Lab Tech's, etc. | <u>1.0</u> | <u>1.0</u> | | |
| TOTAL-O.J.'s | 5.0 | 5.0 | | |

| CONSUMABLES, BY-I Natural Gas Combined Cycle-"G" | PRODUCTS & FUELS DATA | | |
|---|-----------------------|--------|---------------------------------|
| Natural das dombined dycie- d | Consun | notion | Unit |
| Item/Description | _Initial | /Day | Cost |
| Water(/1000 gallons) | | 2,263 | 0.80 |
| Chemicals* | | | |
| MU & WT Chem.(lbs)** Limestone (ton)** Z Sorb (lbs)** Nahcolite(ton)** | 202,221 | 6,741 | 0.16 15.78 3.50 270.00 |
| Other Supplemental Fuel(MBtu)** Gases,N2 etc.(/100scf) L.P. Steam(/1000 pounds) | | | |
| Waste Disposal Sludge(ton) | | | |
| Slag(ton) | | | 10.00 |
| By-products & Emissions Sulfuric Acid(pounds) | | | 68.00 |
| Fuel(MMBtu) | | 52,780 | 2.70 |

| MAINTENANCE FACTORS Natural Gas Combined Cycle-"G" | |
|--|------------------|
| Item/Description | Maintenance % |
| COAL & SORBENT HANDLING | |
| COAL & SORBENT PREP & FEED | |
| FEEDWATER & MISC. BOP SYSTEMS | 2.0 |
| GASIFIER & ACCESSORIES | |
| Gasifier & Auxiliaries | |
| High Temperature Cooling | |
| Recycle Gas System | |
| Other Gasification Equipment | |
| HOT GAS CLEANUP & PIPING | |
| COMBUSTION TURBINE/ACCESSORIES | |
| Combustion Turbine Generator | 8.4 |
| Combustion Turbine Accessories | 0.5 |
| HRSG, DUCTING & STACK | |
| Heat Recovery Steam Generator | 2.0 |
| HRSG Accessories, Ductwork and Stack | 1.5 |
| STEAM TURBINE GENERATOR | |
| Steam TG & Accessories | 1.5 |
| Turbine Plant Auxiliaries and Steam Piping | 1.7 |
| COOLING WATER SYSTEM | 1.3 |
| ASH/SPENT SORBENT HANDLING SYS | |
| ACCESSORY ELECTRIC PLANT | 1.5 |
| INSTRUMENTATION & CONTROL | 1.6 |
| IMPROVEMENTS TO SITE | 1.2 |
| BUILDINGS & STRUCTURES | 1.4 |
| | |